U.S. DEPARTMENT OF AGRICULTURE RESEARCH AND EXTENSION PRIORITIES

Y 4. AG 8/1: 103-7

U.S. Department of Agriculture Rese...

HEARING

BEFORE THE

SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION

OF THE

COMMITTEE ON AGRICULTURE HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

FIRST SESSION

MARCH 25, 1993

Serial No. 103–7

SEP 9

Printed for the use of the Committee on Agriculture

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U.S. DEPARTMENT OF AGRICULTURE RESEARCH AND EXTENSION PRIORITIES

THURSDAY, MARCH 25, 1993

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION,
COMMITTEE ON AGRICULTURE,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:15 a.m., in room 1300, Longworth House Office Building, Hon. Charles W. Stenholm (chairman of the subcommittee) presiding.

Present: Representatives Dooley, English, Volkmer, Holden, Lambert, Smith, Gunderson, Allard, Barrett, Ewing, and Kingston.

Staff present: Glenda L. Temple, clerk; Stan Ray, Joe Dugan, Merv Yetley, and Pete Thomson.

OPENING STATEMENT OF HON. CHARLES W. STENHOLM, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. STENHOLM. This public hearing of the Department Operations and Nutrition Subcommittee will now come to order.

Today we start a series of hearings looking at our Nation's agricultural research capacity. We are truly at a critical point in our Nation's history. Americans have increased concerns about food safety, the environment, and the economy. They are concerned about our production agricultural practices. Today's production system has served Americans well, but the priorities that were driving the system in the past are not necessarily the primary issues confronting producers and consumers today.

On the one hand, we still believe—and I certainly still believe—that we possess in America an agricultural system which is unmatched anywhere in the world. Our food supply continues to be the most wholesome, the most abundant, the safest, and the least expensive in the world. I am continually amazed at the resilience, the ingenuity, the initiative, and the ability to adapt that our farmers have. Commodity prices, though, continue to fall, production costs continue to rise, and yet the American farmer perseveres. This benefits all, as our food supply remains the least expensive in the world.

Yet, on the other hand, we are challenged. We're facing a consuming public which has grown both complacent and overreactive to the greatest food-producing system the world has ever known. The environment, water quality, the use of chemical fertilizers, pesticides in the food supply, microbial contamination of meat, and biotechnology are all examples of issues where many consumers are

not just suspicious, but often in outright opposition to what production agriculture practices. It is interesting that while consumers claim to like farmers, they do not like what farmers do.

Compounding these is the rural development crisis brought on by much of the farm debt crunch of the past two decades. How do we develop agriculture that is not just sustainable and environmentally benign, but also profitable? Any discussion about setting research priorities at USDA must include the influence of our Federal budget deficit. Over the last 10 years, no Government Department, no function of our budget has taken more hits than agriculture. We have been asked year after year to bear more than our share of budgetary cuts. The President's budget reduction plan this year was no different and provides for some specific cuts in the research agencies at USDA.

In an era of declining budgets due to the deficit, we're going to have to do better research with less money by doing it more efficiently. This is going to force us to set better agricultural research priorities. How do we get there from here? How do we set research priorities for U.S. agriculture today? How do we include the concerns of both producers and consumers to forge an agenda for the 21st century? The role of technology transfer through extension and teaching is also essential. How do we maintain linkages between research and education programs when USDA's constituency has grown to include so many diverse groups other than production agriculture?

Those of us on the Department Operations and Nutrition Subcommittee are excited. Not only do we have jurisdiction for food safety, pesticides, and nutrition, but we oversee USDA research priorities as well. We plan to hold hearings assessing the needs of agriculture today and then, through research oversight, seek answers for the questions raised earlier.

Included in the hearing record today will be a number of diagrams describing the changes in funding which have occurred since 1985 at the Cooperative States Research Service. The Cooperative States Research Service is the agency at USDA which provides funding for our State and university land-grant colleges and the 1890 colleges and universities. Since 1985, formula funding has decreased from about 65 percent of the CSRS budget to about 45 percent for fiscal year 1993. Formula funds are those dollars which go to land-grant colleges, 1890 colleges, forestry schools, and veterinary medical schools. They are determined by formulas based on rural population and utilization and are matched with State dollars.

Although actual formula dollars have increased slightly during this time, inflation-adjusted real dollars have decreased. Many individuals believe that this decrease has put pressure on universities, making it difficult to maintain their base level of programs. As the level of formula funding has declined, spending for both special research and facilities grants and competitive grants has increased. Spending for special research and facilities grants has increased from about 10 percent of the CSRS budget in 1985 to nearly 30 percent today. Competitive grants have increased from 22 percent to 27 percent of the CSRS budget during this time. The charts will be in the record after my statement.

In the research hearings we hold, we will attempt to determine the proper means of funding at universities. That is, what is the proper combination of formula funding, competitive grants, and special grants to meet the needs? We will also seek to determine what percentage of research budgets should be basic, applied, and mission-linked, and what are the most proactive roles for extension and teaching education programs. Most importantly, we will determine both how priorities are set and what they are. With the budgetary constraints we are now facing, it is essential to refocus our priorities. To maintain the status quo will result in a further erosion of what we are already doing as fewer dollars continue to be spread throughout the system.

We must begin including not just Congress in the process, but, first and foremost, producers and consumers. Since they are the ones the system was built to serve, they should provide major impact about future direction.

Two words will guide us as we move forward: Relevance and accountability. Is the research relevant to consumer and environmental concerns? Is it relevant to helping farmers and ranchers maintain not only sustainability, but also profitability? Or is it only relevant to maintenance of the status quo? And accountability. Are we accountable with our resources? Do we use them in such a way as to bring a return on our research investment? With your assistance, we are excited about moving forward with confidence.

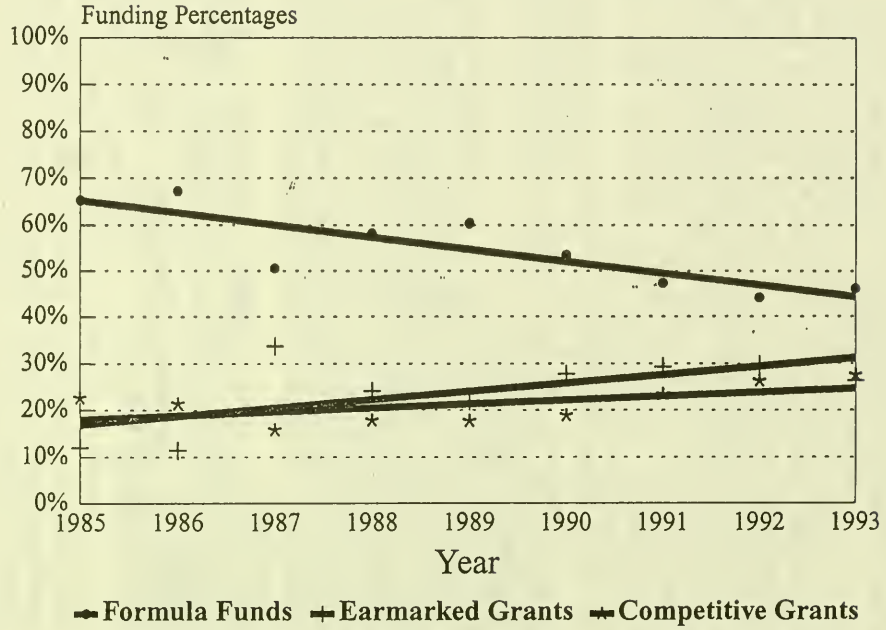
Thank you.

Before I recognize Mr. Allard, I would like to submit the charts for the record along with any prepared statements from the members.

[The charts and prepared statements of Mr. Dooley, Mr. Smith, and Mr. Kingston follow:]

Graph One

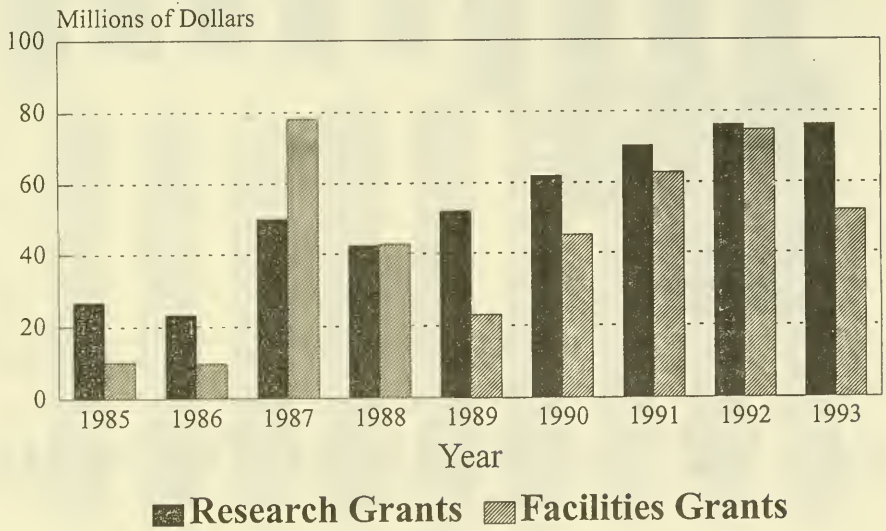
FUNDING AT CSRS



CSRS/Cooperative States Research Service

Graph Two

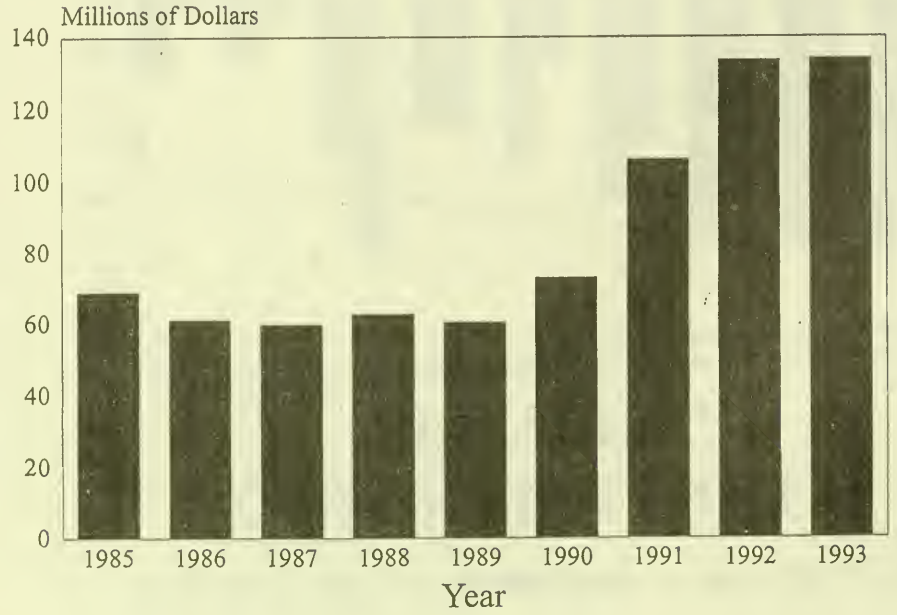
CSRS EARMARKED SPENDING



CSRS/Cooperative States Research Service

Graph Three

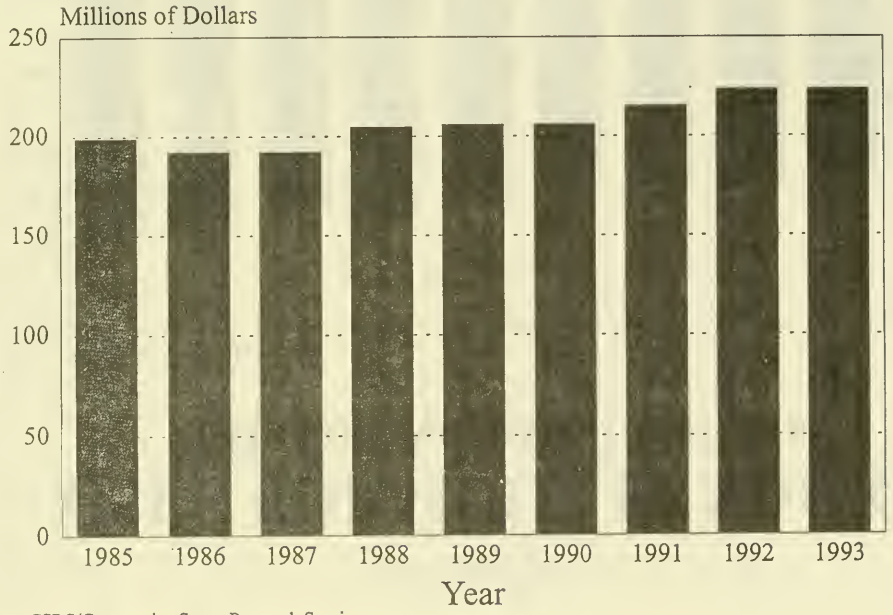
CSRS COMPETITIVE GRANTS



CSRS/Cooperative States Research Service

Graph Four

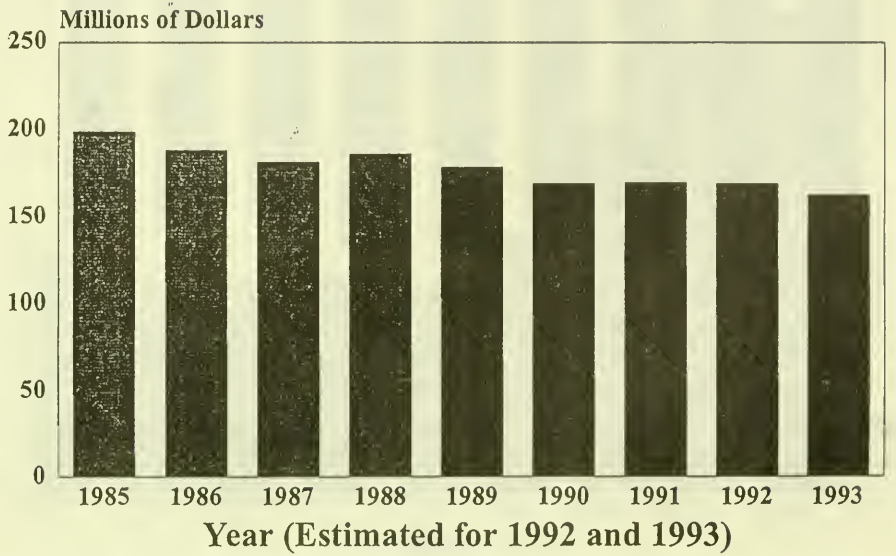
CSRS FORMULA FUNDING



CSRS/Cooperative States Research Service

Graph Five

CSRS FORMULA FUNDING
Inflation Adjusted Dollars



CSRS/Cooperative States Research Service

Opening Statement of the Honorable Cal Dooley

Subcommittee on Department Operations and Nutrition

March 25, 1993

Mr. Chairman, I would like to take this opportunity to thank you for holding this important hearing to review the research agenda of the Department of Agriculture.

The Department of Agriculture's research activities have played a large role in the advancement of American agriculture over the past century, making our industry the most efficient in the world. However, it is clear that in order for the United States to compete in the global economy in the 21st century, we need to increase research into emerging technologies and create an agriculture industry for the future.

I think that this plan for the future needs to include a number of parts. First, we need to develop alternative methods for controlling the pests and diseases that attack our crops. As a farmer myself, I am aware of the increasingly difficult environmental standards that farmers are asked to maintain, the cost of fighting disease and pests on crops, and the need for viable alternatives to combatting these problems. I believe that USDA can play a vital role in concert with major universities, including the University of California, in developing these alternatives.

Second, we need to develop alternative uses for agricultural

products. I believe that the development of non-food uses of agricultural products is vital to sustaining a profitable and growing agricultural industry. The 1990 farm bill authorized the Alternative Agricultural Research and Commercialization Center (ARRC) to bring together the USDA and private companies to develop exciting new uses for agricultural products. The Center is currently reviewing the first set of proposals to be funded under the program and there are some very interesting and viable projects under consideration. I believe that the research arm of the USDA could be very helpful in the development of these new products.

Finally, I believe that the biotechnology industry needs to be an important part of the our plan for the future. The biotechnology industry will become an important part of agriculture starting this year with the introduction of Calgene's "flavr savr" tomato. I think that biotechnology can be the tool that farmers will turn to in the future to address a multitude of problems facing agriculture production. I hope that the USDA becomes a partner in this effort. I believe that the Western Biotechnology Consortium is an important way for the federal government to be a partner in the development of this exciting new technology.

Mr. Chairman, I look forward to working with you in the coming months to focus the research agenda of the USDA in these important areas. Thank you.

STATEMENT OF
ROBERT F. SMITH
BEFORE THE
SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION
MARCH 25, 1993

Mr. Chairman, thank you for calling this hearing today.

As you know, I have be a strong and vocal spokesman for production agriculture. It has always been my view that the role of this Committee, and that of the U.S. Department of Agriculture, should be the assist, promote and, when necessary, defend the farmers and ranchers of this nation.

The federal spending commitment for agriculture research has remained relatively flat for some time. Its about $1.3 billion today, adjusted for inflation, its about the same as we were spending twenty years ago.

And, given the current budgetary climate, this is not likely to change in the near future. As federal resources for agriculture continue to contract, we must reexamine our priorities to ensure we are focusing on the needs of production agriculture.

The Clinton Administration's proposals will doubtless lead to increased costs for farmers. One analysis I have indicates the Clinton plan will cost a typical wheat ranch in Oregon an additional about $12,000 in new fees, taxes and program benefits. If production agriculture is to remain competitive on the world market, research will have to help provide the tools.

Tightening budgets also increase the urgency of ensuring that each dollar spent on research, regardless of its source, contributes to the overall effort. The U.S. Department of Agriculture is uniquely placed in the agriculture research community to coordinate research in order to prevent waste and duplication. It may make sense to strengthen this role.

And finally, we must take on the responsibility of watching other research, both in the private sector and in other departments, which have implications for agriculture. This returns to my original assertion about the importance of being the advocate of production agriculture.

The Department of Health and Human Services, the Environmental Protection Agency, the National Resources Defense Council and other organizations simply don't care if their research, no matter how faulty, adversely impacts agriculture. The Alar debacle is a perfect example. NRDC's amateurish study cost the apple industry $100 million that year.

Mr. Chairman, these are the thoughts I will have in mind as we receive testimony from today's witnesses.

Statement By

Honorable Jack Kingston
U. S. Representative
Georgia 1st District

Subcommittee on Department Operations & Nutrition
House Committee on Agriculture
Thursday, March 25, 1993

Honorable Charles Stenholm, Chairman

Mr. Chairman:

Thank you for affording us an opportunity to discuss the vital topic of agricultural research, and the role of the Federal government in attempting to keep America in the forefront of new agricultural technology and productivity.

Agricultural research in the past has led to our nation's stature as the leading food and fiber producer in the entire world. Agricultural research has allowed a diminishing number of U. S. producers to feed and clothe a rapidly growing world population, while also providing

an abundant, reliable, inexpensive supply of highly nutritious food and superior quality fibre for their own countrymen.

I would point out my concerns -- which I know many of my Colleagues on the committee share -- that we probably have not provided sufficient funding over the past 15 years or so necessary to ensure continued American dominance in the field of agricultural research, research application, and technological advancement. We must concentrate our resources in the future and do a better job of allocating funding if we are to retain our leadership and enjoy the economic benefits of better, more productive, more varied agricultural production.

Mr. Chairman, I don't want to get us too far off track during this session, but I would be terribly negligent if I didn't express one other area of prime concern for me -- and hopefully for a vast majority of our fellow committee

Members. I am astounded by the immediate and devastating impacts which the recently debated 1994 Budget Resolution will have on farmers, ranchers, agribusinesses, and the economic and social future of America's rural towns and communities. It does not do much good to increase the funding levels and the effectiveness of agricultural research programs if we are facing a very real threat that there will soon be no producers left in business to take advantage of new research and new technological advances.

The day before yesterday, the Food and Agricultural Policy Research Institute presented testimony before the Subcommittee on General Farm Commodities which should make each and every one of us sit up and take notice before pressing forward with the current Budget Resolution's "blueprint for agricultural disaster" for U. S. producers and consumers. If I am reading the FAPRI initial review of the economic impacts correctly, then the

combination of reduced farm program levels, increased assessments and user fees, the "Btu" energy tax, the inland waterway tax, and the host of other revenue provisions in the Resolution will drive substantial numbers of producers out of business over the next 4 to 5 years.

Of course, when these producers can no longer afford to stay on the land, an economic "tidal wave" of adverse impacts begins to roll throughout the entire economy -- wiping out the smaller rural towns and communities first, but with absolute certainty crashing down on the suburbs and inner cities of America as well.

This is not a case of a modern-day "Henney-Penney" running around shouting that the sky is falling! The adverse impacts and the ultimate disaster which will be felt throughout our country is very real and very predictable . . . it will happen unless we on this committee use all of our energy and all of our ingenuity to change

the course of fiscal events which the House of Representatives set in motion last week during the budget process.

Thank you, Mr. Chairman, for patiently allowing me to address this crucial aspect of the current situation. I again would simply remind everyone present today that our very real concerns and our very good intentions about agricultural research programs and facilities are of little avail when all the farmers and ranchers are gone from the land, when we through out short-sightedness have turned out the lights on Main Street rural America, and when our consumers are forced to contend with uncertain supplies of food and fiber from often unreliable foreign sources at sky-high prices!

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Mr. STENHOLM. Mr. Allard.

OPENING STATEMENT OF HON. WAYNE ALLARD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

Mr. ALLARD. Mr. Chairman, you're to be commended for holding these hearings to review the Department of Agriculture's research agenda. While the Agriculture Committee authorizes research every 5 years in the farm bill, needs, agendas, and priorities often don't wait until the next farm bill. Indeed, the way events are progressing in agriculture, they often can't wait even from year to year.

Be that how it may be, Mr. Chairman, the future of agriculture depends upon improving new procedures and new techniques on farms and ranches. Improved research will be critical if we are to make agriculture profitable. It's my hope this subcommittee and, eventually, the full committee will examine the best way to ensure that what resources USDA has available for research are allocated based upon the merit of the institution applying and the need for the research.

Mr. Chairman, we both sit on the Budget Committee, so I won't start into my limited resources speech. Suffice it to say, though, whether we spend $1 or $1 billion, it should be focused on a clearly definable goal that will help our farmers be more productive, profitable, and environmentally responsible.

Finally, I look forward to hearing our witnesses tell us what their role is in setting research priorities. The part that has been explained to me is certainly interesting; however, the process does seem somewhat confusing. So I look forward to hearing what the witnesses have to say about this process and to hearing any suggestions that they may have for streamlining the procedure.

Mr. Chairman, I'll yield now so we can get on with the hearing and the testimony. Once again, I appreciate your interest in this area.

Mr. STENHOLM. Mr. Volkmer.

[No response.]

Mr. STENHOLM. We'll now call our first panel: Dr. Savage, Dr. Kloek, and Dr. Offutt.

Our first witness will be Dr. James D. Savage, associate chair and assistant professor, department of government and foreign affairs, University of Virginia.

Welcome, Dr. Savage.

STATEMENT OF JAMES D. SAVAGE, ASSOCIATE CHAIR AND ASSISTANT PROFESSOR, DEPARTMENT OF GOVERNMENT AND FOREIGN AFFAIRS, UNIVERSITY OF VIRGINIA

Mr. SAVAGE. Thank you, sir. Mr. Chairman, my name is James D. Savage, and I'm associate chair and assistant professor in the department of government and foreign affairs at the University of Virginia. Thank you for inviting me to share with your subcommittee my thoughts on the issue of employing direct appropriations, or earmarks, for funding university-conducted agricultural research.

In 1992 I served as a consultant for the Congressional Research Service, for whom I analyzed the trends in earmarks for univer-

sities and colleges during the fiscal years 1980 through 1992. First let me say that an earmark, by Office of Technology Assessment definition, refers to "a project, facility, instrument, or other academic or research-related expense that is directly funded by Congress, which has not been subjected to peer review and will not be competitively awarded."

Using this definition as a guide, my data indicate that during fiscal years 1980 through 1992, approximately $2.5 billion were earmarked for some 234 universities and colleges. The trend in earmarking during these years clearly is one of rapid growth, as shown in table 1. In fiscal year 1991, for example, $470 million in research funds were earmarked, and that amount grew in fiscal year 1992 to $708 million.

Of this total figure of $2.5 billion, approximately $625 million, or a quarter of all earmarks, have their origins in agricultural appropriations. Here again, the trend is one of sustained growth. In fiscal years 1990 and 1991, the level of earmarking appeared to plateau at about $100 million, and then jumped by 34 percent to $146 million in fiscal year 1992. Let me note that these figures for agricultural earmarks, particularly for the early years of this study, are conservative. Earmarks are often difficult to identify, and I estimate the total figure to be $10 million to $25 million higher and, thus, range at least in the area of $650 million.

There are several negative consequences of earmarking agricultural research. One consequence is the harm it does to the legitimacy of academic agricultural research in general. Two Presidents, Mr. Reagan and Mr. Bush, singled out university-conducted agricultural earmarks as examples of waste and pork barrel politics, and a cause of the Federal deficit, in their State of the Union addresses. These examples, which are often comically highlighted by the media, can only cause the public to question the effectiveness of the Federal Government's research efforts in this field, and to increase their skepticism about Congress and how it operates.

Earmarking's negative influence on the legitimacy and status of agricultural research also extends to the universities that conduct this research. Every member of this committee and subcommittee should be aware that there are universities that would never consider attempting to earmark the National Institutes of Health or the National Science Foundation, but who willingly hire lobbyists and seek agricultural earmarks.

In 1989, I produced a list of academic earmarks that included agricultural projects. The president of the Association of American Universities criticized the list by saying that agricultural research had a distinctive "culture," where the standards of NIH and NSF do not apply. Thus, one ivy league university, noted for its decision to refuse a $5 million earmark for a supercomputer, which was funded in the defense bill, accepts and has increased its efforts to secure agricultural earmarks.

Only recently the issue of whether agricultural projects should be counted as earmarks has been raised within AAU. Chancellor Joe Wyatt of Vanderbilt University, for example, has asked his fellow AAU presidents, "Is AAU's stated position in opposition to earmarks undercut by tolerance for agricultural earmarks?" In addition, former AAU president Robert Rosenzweig has acknowledged

that AAU may have been mistaken in limiting its condemnation of direct appropriations in the agricultural appropriations bill.

Unfortunately, this tolerance for agricultural earmarks that Chancellor Wyatt addressed continues to be the dominant opinion within the university research community. I believe this view of agricultural research within academia, where pork barrel is the accepted name of the game, helps to reduce agricultural research in general to second-class status within the academy.

Moreover, the academy's green light for earmarking the agricultural appropriations bill has resulted in universities and colleges seeking projects there that have little to do with agricultural research. These projects include technology centers, trade centers, and biology centers. When academic institutions fail to obtain earmarks in those Appropriations Subcommittees where academic earmarks are generally shunned, such as in the House Labor-HHS-Education Appropriations Subcommittee, they turn to other subcommittees to fund their projects. The effect of this, of course, is to reduce the funds available under the Appropriations Subcommittee allocation for true agricultural research.

The subcommittee should also be aware that some universities attempt to avoid the charge that they are earmarking by subcontracting their project in a manner that involves a modified form of peer review. This practice is not uncommon in the special projects awards funded from the agricultural appropriations bill. For example, a university will obtain an earmark and, acting as the principal investigator, share the award with several other universities organized as a consortium. This is the case with the mosquito research funded through special projects.

In another example, the Midwest plant biotechnology consortium consists of an estimated 18 universities. The consortium establishes a peer review panel, which sometimes consists of faculty only from those particular universities, to allocate the funds within the group. Thus, although the initial project was earmarked, the subcontracting faculty and institutions claim that their project underwent peer review, but peer review comprised of peer review panels they themselves established.

I raise these points because I believe the subcommittee should be aware of how universities and colleges are adapting to what is the willingness of the Congress to earmark academic research. To its credit, the academic community in general has sought an expansion of competitive USDA research programs, but has often confronted hostility from the agricultural Appropriations Subcommittees. Proposals for expanding competitive research programs, for example, were met with counterproposals to restrict indirect cost rates for competitive grants. In the face of this resistance, universities and colleges continue to adapt to the resource allocation system Congress has allowed to develop.

There are other, more familiar negative consequences to earmarking. The most obvious is that without peer review or merit review, there's little or no systematic evaluation and accountability for determining whether these earmarked projects represent the best research for the dollar. After talking with appropriations subcommittee staff, it is my understanding that the USDA has rarely, if ever, evaluated an earmarked project and found it to be wanting.

It is not clear to me if this is the situation because the USDA is reluctant to offend a Member of Congress who sponsored the project and the university that conducted the research, or if all of these projects in fact produce acceptable research. Even if all these projects did produce "acceptable" research, however, this does not mean that the best research was funded to meet specific policy-driven needs. I suggest that the best research is more likely funded through a competitive merit review system than through earmarking.

In any case, if $650 million or more have been allocated through earmarking for agricultural research, what have these projects produced for the taxpayer? Those universities that have received the bulk of these earmarked dollars should be called upon to report on just how many patents, new discoveries, and improvements in American agriculture have resulted from these funds. I am delighted that Chairman George Brown, in the Science and Technology Committee, has made such requests of a number of academic institutions.

Earmarking also greatly diffuses the Federal Government's ability to set priorities and address national problems. Often enough, these earmarked projects reflect the particular interests of university researchers who work through their institutions and the appropriations committees to secure funds for their specialized research concerns. How these interests fit into a broad strategy for improving agriculture, for example, is not always apparent. Meanwhile, those USDA competitive grants programs, which are more likely to reflect the general policy goals approved through the normal legislative process, must compete with these earmarked projects for scarce dollars within the allocation for the agricultural appropriations bill.

In summary, Mr. Chairman, the practice of earmarking academically conducted agricultural research is increasing. Given the obvious incentives, universities and colleges will continue to seek earmarked funds and do so in a more sophisticated manner. These funds, however, lack the accountability, emphasis on merit, and reference to meeting national priorities that are more typical of peer-reviewed research.

Thank you.

[The prepared statement of Mr. Savage appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you.

Next we'll hear from Dr. James Kloek.

STATEMENT OF JAMES A. KLOEK, CHAIRMAN, NATIONAL AGRICULTURAL RESEARCH AND EXTENSION USERS ADVISORY BOARD

Mr. KLOEK. Thank you, Mr. Chairman. I appreciate the invitation to appear this morning.

I'm pleased to represent the National Agricultural Research and Extension Users Advisory Board, or the UAB. The UAB was established by Congress in 1977. We are private citizens serving as volunteers to provide user feedback to the USDA and the Congress about science and education programs. We're your customer advi-

sory board. We're here to tell you what works and what doesn't, from a customer point of view.

I've submitted my full testimony in writing this morning for the record, and what I'm going to do now is give you a brief summary of that testimony.

Mr. STENHOLM. Without objection, your prepared statement will appear in the record.

Mr. KLOEK. I'm here today to talk about facilities allocation and upkeep—specifically, how do we reform the system of federally funded agricultural research facilities in order to meet scientific priorities, close outdated and rundown facilities, and establish an effective planning process for future needs? In brief, the UAB believes that to accomplish these objectives, we must develop an overall cohesive national strategy for agricultural research and a review mechanism to determine the extent our existing and proposed facilities will meet that strategy's long-range goals and objectives.

Now, why have we concluded that? The existing system of facilities is, in many cases, outdated, understaffed, and in disrepair. Many facilities remain in operation despite evidence that they could be closed or consolidated. I'd like to highlight some specific facility problems which the UAB has identified.

First, many of these facilities are in need of maintenance. In 1990 the Agricultural Research Service, or the ARS, made an estimate of what it would take to bring all of their facilities into a good state of repair and to take some of the older ones and get them into condition to meet modern health and safety codes. They concluded that for every dollar they were currently spending on research, they would have to spend an additional 76 cents to maintain their facilities. That's a staggering figure.

Second, buildings are scientifically staffed at less than full capacity. ARS has about 1,500 square feet of facility space for every employee they have. Now, you've got to be a little careful with that statistic, because that includes greenhouses and auditoriums and things that are pretty consumptive of space, but even given that, there's really very little doubt that many of these facilities are understaffed with scientists.

The support-staff-to-scientist ratio is too high in many of these facilities. It takes a certain number of support staff to operate a building regardless of how many scientists are in it, and so because of this underpopulation of scientists in these facilities, that oftentimes will drive the support-staff-to-scientist ratio well above the commonly accepted 2:1 ratio that people feel would be appropriate.

Many of these facilities are remote from scientific centers. In order to effectively carry out research, scientists need to interact with each other, and a lot of these facilities are too small to support a critical mass of scientists, and they're too far away from other centers to allow effective collaboration.

There's no national agricultural science facility plan, and so what we tend to see is a rush to hot issues. If, in a given year, biotechnology is a hot issue, then what you see is a whole rash of facilities plans to do biotechnology, and this oftentimes will ignore very present needs in other, less-glitzy disciplines.

Finally, the system of allocation is politicized. The majority of the buildings that get built with Federal funds actually go to the State

universities and are then turned over to the universities. As Dr. Savage has indicated, universities are now hiring high-priced lobbying firms to win congressional appropriations. So the pressure for earmarking for facilities is coming not only from Congress, but from the universities as well.

In the absence of a strategic national facilities plan, there really is very little reason to resist this trend to earmarking. It's the only game in town.

Now, in addition to these specific problems, there's a more general systematic problem: Cash invested in a facility is not available to invest in a research or teaching program. So every time we make a decision to make a capital investment in bricks and mortar, we're making a tradeoff between doing that and an operational investment in research and teaching. Additionally, once this capital investment is made, you then need an operating budget to operate this new facility. It's got to be maintained, it's got to be heated, you've got to put people in it. And in a time when USDA operating funds are not increasing and, in fact, may well be decreasing, those new operating funds for these facilities have to come from somewhere, and where they're coming from is programs.

This erosion of base and competitive programs that is going on is a very serious problem and one that the UAB has commented on several times in the past few years. We see no mechanism in place to allow these tradeoff choices to be made on the basis of any strategic plan or policy.

So what are we recommending? We're recommending two things: First, that a national strategic plan for science and education be prepared. This would lay out what the high priority goals of the science and education system are and how facilities closings, maintenance, and construction will support those goals. What we need, we think, is what we call in industry a participation strategy. We need to take a look at everything the USDA is doing. It's the board's opinion that the USDA is trying to do too many things. They simply don't have the resources to adequately support all the things they're trying to do. Priority-setting decisions must be based on those critical things that absolutely must be done, and then fund those programs to full capacity to ensure that we succeed at them. We then need to look at the programs that are at the bottom of that priority list and cut them completely.

With that plan in hand, we are then reiterating our call for a national external peer review panel. This panel would serve the Secretary of Agriculture and the Congress and provide evaluations of current and proposed facilities and how well they would fit with the strategic plan. Its members would be appointed by the Secretary of Agriculture, with recommendations from the chairmen and ranking members of the Senate and House Agriculture Committees, the National Academy of Sciences, and other user, academic, and agriculture industry organizations. It would be composed of individuals from both the public and private sector with expertise in science, engineering, management, research and development, and technology transfer.

Details of this panel and the procedures and processes it would use are in my written testimony. The end result would be an independent review process which evaluated how well proposed invest-

ments in new or existing facilities fit the goals and programs in the strategic plan.

Mr. Chairman, in conclusion, the UAB believes that our whole present agricultural research facility system needs an overhaul and that the time to do that is now. It is the UAB's opinion that the Congress should delay any authorization or appropriations of funds for additional facilities until we have in place a strategic national plan and mechanisms, such as the national external peer review panel we have proposed, to evaluate all current and proposed facilities.

Thank you for the opportunity to speak this morning, and I'd be happy to answer any questions you have.

[The prepared statement of Mr. Kloek appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you, Dr. Kloek.

Next, Dr. Offutt.

STATEMENT OF SUSAN E. OFFUTT, EXECUTIVE DIRECTOR, BOARD ON AGRICULTURE, NATIONAL RESEARCH COUNCIL, NATIONAL ACADEMY OF SCIENCES

Ms. OFFUTT. Good morning. Thank you very much for inviting me, the executive director of the Board on Agriculture, part of the National Research Council, to be with you this morning. The board and, indeed, the National Research Council are vitally interested in the future of agricultural science and agricultural research and what it does to support the prosperity of this Nation's agriculture and the quality of its environment, as well as the health of its people.

In that respect, I'd like to just touch briefly on two areas which are of particular concern to the board and to the National Research Council, which I think are relevant to the issues you're discussing here this morning. In the first instance, I'll talk a little bit about the competitive grants program supported by the board, which has grown into the National Research Initiative, and, in the second, a study the board proposes to undertake which concerns the conduct of teaching, research, and extension in the land-grant colleges of agriculture.

To begin, the National Research Initiative, which is the competitive grants program for peer-reviewed research at the Department of Agriculture, largely grew out of a proposal by the Board on Agriculture in 1989 that sought a significant expansion in the amount of funding provided to agricultural research through peer-reviewed grants. Over most of the history of the system, since the late 1800's, research has been supported by formula grants. Competitive grants had not been used in agricultural research to the extent that they had been used in other areas of science.

The board recommended that there should be six areas of endeavor that relate to national priorities in agricultural science and research, and they are quite familiar to this committee, which included the authorization for this program in the 1990 farm bill. Ultimately, the board, and the farm bill, asked that the program be funded at $500 million annually, and we are hopeful that someday we will reach that goal. But what's important this morning is the

rationale for a competitive research grants program and how that supports the attainment of national priorities.

Specifically, the board has argued that the full implementation of this research grant program would ensure the continued benefits of a high return to investment in agricultural research. It would also encourage the participation of the entire science community in agricultural work. At the same time, it provides flexibility in response to utilizing new scientific discoveries and dealing with new problems. Finally, it allows agricultural science to make contributions to other fields of endeavor. This happens frequently, and we want to encourage that kind of cross-fertilization whenever we can.

The board was also quite specific about the way in which the grants program should be run and the mechanisms by which the research should be carried out. It identified four kinds of grants which were important to working across fields in science as well as within them. It sought—and these have subsequently been implemented in the Department's program—grants that would be given to individual principal investigators, which is the traditional way of awarding competitive research money, but also—and this recognizes the nature of agricultural problems—that multidisciplinary teams ought to be awarded funding, and that there should be multidisciplinary teams that address not just basic research, but mission-oriented research, which is one of the important aspects of agricultural research which can often distinguish it from other fields of science, at least in the Federal arena. Finally, it recognized that the importance of the science infrastructure, if you will, meant that there would be cases in which we'd want to make strengthening grants to individual institutions or scientists in recognition of the need to increase their contribution to the national effort.

Now, the board is quite pleased that in spite of the difficulty of finding Federal funds these days that the funding for the research initiative is now at $97.5 million. But we recognize that it's not where we would like it to be, since that's some distance from $500 million. While we don't want to be strictly bean counters about it, we think that it represents a significant opportunity cost for the Nation if we can't make the full investment in this program. We are hopeful, however, that with the fiscal year 1994 budget, in which agricultural research is recognized as an investment in America's future, such a view of it will prevail. Then, we can look forward to a higher level of funding and more benefits from this program.

I want to add that the Board on Agriculture doesn't believe that competitive grants should be the exclusive mechanism by which agricultural research is funded. It believes that expanding this program restores or introduces balance into the portfolio of funding mechanisms that we currently use at the Federal level. But, it recognizes that in many cases formula funding will be the appropriate way to address long-term site-specific problems in agriculture, and that on occasion special grants would be required to address, for example, specific Federal needs. There were special grants made over the past several years to fund work in UVB radiation, which was important to supporting the Federal science effort in understanding global change.

So the board believes that there's a balance required among competitively reviewed grants, formula funds, and, where appropriate, individual special grants. The question of balance, of course, is the most difficult one to resolve, but we're pleased to be here anyway this morning to help you in making that determination.

If I could speak for a moment about a project that the board hopes to begin soon, it concerns the future of the land-grant colleges of agriculture. Clearly, the competitive grants program is important, but if the board were only to worry about that, it would be as if you built your house with the best quality nails you could find and then didn't worry about the rest of the materials. So the environment in which research is undertaken, the resources available for research, teaching, and extension, which together characterize the tripartite mission of the land-grant system, is also important to the board.

I think there's a consensus in the land-grant community that it's at a crossroads, that there are many difficult questions to be answered, and that it's appropriate that the board, which has a long history of trying to work with the community in furthering national goals, come on the stage now to conduct a study of the future of the land-grant system. The primary goal of the study is not to reduce the system to individual components or to be critical, except in a very positive way, and that is to ensure the continued success of the system in supporting this Nation's agriculture.

The study is conceived to have objectives which address the description of the system to gain an understanding of how we service agriculture and consumers today. The study will analyze the colleges' role in providing instruction, performing research, and transferring technology. Ultimately, the expert study panel that we appoint will synthesize these findings in a way that permits colleges to improve or adopt new methods of organization that really respond to the situation today of constrained resources. We're talking about the question, for example, of how colleges organize their resources to get the job done, to achieve the mission of the land grants and maintain agricultural productivity, with attention and equal emphasis on quality natural resources and issues in consumer food safety and quality.

In undertaking this study, though, the board recognizes that none of the outcomes or findings of the study can be imposed by Federal fiat. We have a decentralized system whose strength is in the States. But there is an aspect in which there's a Federal interest. The national perspective that the board has will, one, promote technology transfer among colleges which are struggling to reconfigure their institutions to meet the challenges of today. The study will also have implications for the Federal–State partnership which has existed since the late 1800's, including the conduct of the formula grants, special grants, and probably also a revisit of the role of competitive grants.

We are hopeful that we will start the study this summer. I think it's worth pointing out that the National Research Council has committed more than $750,000 of its own funds, of which there are very few, to study this problem. I think it's probably a first in the history of the National Academy of Sciences to commit such a large

amount of its own resources to agricultural science, but it underscores the importance to this Nation's prosperity.

We have worked closely with the Department of Agriculture to have them be a partner. We have a commitment for some support from the Department. It's a bit of a disappointment, because we will necessarily reduce the scope of the study, which is unfortunate, given the enthusiasm we have found in the system for it. But, like everybody else, the National Research Council does the best with what it has, and we are hopeful that in the near future, in the coming years, we will be able to report to you on the findings of that study.

Thank you very much.

[The prepared statement of Ms. Offutt appears at the conclusion of the hearing.]

Mr. STENHOLM. We thank each of you.

Mr. Smith.

Mr. SMITH. Thank you, Mr. Chairman.

I apologize for being late, but I've read each of your statements. Thank you very much for being here this morning.

Dr. Kloek, I was interested in particular in your thoughts about reviewing the many contracts, the many research programs that seem to have been proliferated around Government in the past years without much organization. The Alar issue always comes to mind as the great debacle. I wanted to ask you specifically if you had thought about, in your program for a review panel, including other agencies of Government research which impact agriculture and, in addition, whether you would have thought about including private research in an amalgamation of review.

Mr. KLOEK. Yes, the board has discussed that. I'm not quite sure how it would work with a review of both public and private research. Certainly, the board has had a lot of discussions about other agencies, and the Environmental Protection Agency is one that comes up a lot since it does have an impact on American agriculture.

When the UAB developed its proposal for a national and comprehensive strategic plan, we knew many agencies in the Department had strategic plans. The ARS has a very good one, for example. But we're looking for something at a higher level. I think this national strategic plan should be set by the Department of Agriculture, with input from Congress, but it would certainly be our hope that the plan would set a national priority so that other agencies, like the Environmental Protection Agency, could use it as a litmus test for their programs.

Mr. SMITH. Well, let me take an example of the worst thing I can think of, the Alar issue. In a hypothetical of what you have in mind, let's assume that your national board was created and this question on Alar came up. Would it be your thought that you would look at the specifics of the research done on Alar and either recommend that it be reviewed or that it be endorsed or that it be supported or that it be denied?

Mr. KLOEK. I want to keep a couple of things straight here. The board we're proposing is limited to a review and evaluation of facilities. The strategic plan, however, would certainly be something that could influence what you're talking about. As an example, in

its 1989 report, which was written about the time of the Alar scare, the UAB pointed out that while trace amounts of pesticides and toxic chemicals in food may be of concern, the more traditional kinds of food safety issues—pathogens and microbial toxins—remained very important issues. Of course, events just recently with the *E. coli* episode in the Pacific Northwest bore that out.

I would think that the strategy would be to set a kind of balance so when you're looking at food safety there would be a balance between what we're looking at in terms of trace levels of pesticides in food and, in an acute sense, anyway, more important things of microbial contamination. So when research funds came to be allocated, that balance would be reflected from the strategic plan.

Mr. SMITH. Thank you.

Mr. STENHOLM. Mr. Dooley.

Mr. DOOLEY. Mr. Chairman, I'd ask unanimous consent—I have a statement that I'd like to have entered into the record.

Mr. STENHOLM. Without objection, your prepared statement will appear in the record at the beginning of the hearing.

Mr. DOOLEY. I guess a lot of us are concerned, and I know the chairman has talked about it at times, too, when we're in this era of declining budgets, and certainly agriculture is going to be facing more challenges than most any other Department, it really is a challenge to the sector and certainly our researchers to develop the tools to allow us to maintain our competitiveness, and certainly the only way we're going to maintain that is by being on the leading edge of technology.

We've got to continue along the path of increased investment in some of the biotech and the biogenetics, which are going to allow us to be that low-cost competitor, but also there's, I think, an increased frustration with farmers out there that we're not giving enough attention to the application of some of the basic research and the research that's done at some of our many fine institutions.

I guess in that area is where I hope that we'll see increased focus given to some of the practical applications and applied research and even working with some of the programs that were a part of the 1990 farm bill—the AARC program, the alternative agricultural research and commercialization—trying to find different uses for a lot of our basic commodities that can expand the market opportunities for many of our producers out there.

My question is, in the different capacities that some of you serve in, how are these decisions made given that you have limited resources? How do you decide the mix between what you're providing for basic research versus some of the applied? Maybe it's not an appropriate question.

Mr. SAVAGE. I think within the university community, the emphasis is on basic research. There is a desire, or at least lip service, to encourage or think well of applied research, but the incentive structure in academia is basic research.

Mr. DOOLEY. But even from a university perspective, do you see a deficiency in the transmitting of that basic research into actual benefits to the ag sector? I mean, that's what I'm concerned about. We see a lot of great things that come out of our universities, but they don't necessarily ever materialize and manifest themselves in real benefits.

Mr. SAVAGE. Universities really aren't structured or, like I say, the incentive system—and this applies not just to agriculture, but in other areas, too, there's been a great deal of concern about taking university research and having it transmitted through technology transfer in other areas, and it's not something that the university thinks about. I'm using this as sort of a reified concept, but the incentive structure really is for the basic research with the assumption that, through the diffusion of knowledge, the private sector will take these issues up and develop them. There's a real problem, and this is not only in agriculture, but it's in other areas as well.

Mr. DOOLEY. Yes. I guess the comment that the university doesn't really think about that, I know that was probably an overstatement, but I guess that's where the real concern is. Maybe we have to give more attention to the universities also as part of their charge to be responsible for finding ways to build public-private partnerships to get the research out to the industry, whether it be ag or whatever else, so it can be applied.

Mr. SAVAGE. I think there are efforts to set up new organizational structures that would try to bring this about.

Mr. DOOLEY. This is a little more specific. When we have an instance such as what is going to be the elimination of methyl bromide, which is a real important product that's used in agriculture, and there really at this time isn't an alternative, how do we ensure that some of our Federal dollars are being utilized in a manner to help the private sector as well as the public sector develop an alternative or encourage research in that area? How does that happen, or is it happening?

Ms. OFFUTT. Right now I'm aware of the fact that the Department of Agriculture is trying to structure a research plan to find alternatives for methyl bromide. It will be a few years before it's taken off the market, and so that's one step. The board is working with the global change program in ARS to make sure that we get science together to support that effort. In the case of methyl bromide, you had a legislative imperative coming out of the Clean Air Act, so you could organize around that principle.

I would also, if I could, mention in regard to your earlier question about this translation of basic to applied research, that the next panel actually consists of people who make those operational decisions every day. It's also fair to say that the strength of the agricultural research system has been its ability to translate basic to applied, and the concerns that the board has when it proposes competitive research grants is how to take a new science, molecular genetics, and continue in that tradition.

We hope that by establishing these multidisciplinary research teams, for example, that you get a better feel for the applied problem that a farmer will face in the field, that a molecular geneticist by himself or herself can't imagine what kinds of conditions will be encountered out in the field. You need plant breeders, you need people who understand soil science, and so on and so forth.

We're all struggling with how to make sure that the system is going to be effective in the future.

Mr. KLOEK. The comment I'd make on technology transfer is that's an area where we've seen the Agricultural Research Service

change and improve a lot over the last few years. The ARS has become much more conscious about their need to cash some of this technology out there in the public sector. They are saying, "we've made this public investment in it, and now to really cash it, we've got to get it out there and get people using it." I think they've established more CRADA's than any other Federal agency and are working through a lot of different ways to transfer the technology to the private sector.

So if universities or other people are looking for a model to do that, I think they should go talk to ARS. They're doing a pretty good job of that.

Mr. DOOLEY. Thank you.

Mr. STENHOLM. Mr. Allard.

Mr. ALLARD. Dr. Savage, you had a lot to say about earmarking in your testimony. Do you think it would be appropriate to have a peer review before we go through the appropriations process where earmarking occurs?

Mr. SAVAGE. If you're going to have earmarking, there needs to be some sort of evaluation of it before and after, and that's one of the big problems. I've seen this work, I've participated in it, and what happens is that some researcher has an idea, gets the university to sponsor it, and the university administration is often sort of passive in this process because they don't know the science involved in it, but they go ahead because they want to satisfy the researcher, and they bring it to a member who wants to help out the university. There's a proposal usually attached to this, but there's no up-front evaluation of how good this is. There's little or no serious evaluation after the project has occurred.

If you're going to have earmarking, then certainly some sort of process to determine whether or not this is good science is appropriate, but it also has to be a serious review, because, quite frankly, the evaluations that have occurred are very lukewarm because the agencies are afraid of antagonizing Members of Congress.

Mr. ALLARD. Do you have any thoughts about whether formula funding or just strictly competitive bidding for research is the best way to go, or do we need a combination?

Mr. SAVAGE. I think the combination has worked reasonably well. The issue is, again, whether it's a formula or not or whatever the process is, there has to be some sort of serious process that evaluates whether or not the taxpayer's dollar has been used well and what is the outcome. If an institution or researchers have not been putting those dollars to work in a proper fashion that's useful, then there should be some mechanism of cutting that off.

Mr. ALLARD. I guess with formula funding, we're making an assumption that if you're in an area that has more agriculture in it, there would be more agricultural need for research. That's sort of the basic underlying assumption, I would assume. It doesn't necessarily reflect the quality or the ability of those researchers to do that research, and I wish you'd address that a little bit.

Mr. SAVAGE. What you've got basically is an entitlement, and you're saying, "You should get this because of past practices or perhaps because you have so many people in the agricultural area in your State" or something. It's an entitlement that doesn't provide for serious merit review, and you could do that for any area. Sup-

pose the National Science Foundation's funds were distributed on a formula basis. The problem is you just don't have the determination of whether or not this is good science in a rigorous process.

Mr. ALLARD. Dr. Offutt, you talked a little bit about this area on formula funding and competitive research. What is your thinking? Should we go strictly competitive based on the ability to do research and do away with formula and earmarking, or is it appropriate to have a mix?

Ms. OFFUTT. Well, the board believes it's appropriate to have a mix, which is the answer which is most difficult to implement, unfortunately.

Mr. ALLARD. Yes.

Ms. OFFUTT. But one of the things that the board wants to consider is what the role of formula funding should be. It exists because there are geographical site-specific problems in agriculture that still, even though we know a lot more about basic science than we used to, need to be addressed in situ. There are mechanisms for quality control. I think we can talk about whether or not they're adequate. But the premise is that agriculture is not like other endeavors, like ball bearing manufacturing, because you've got to do what the longitude and latitude allow you.

The appropriate mix is a more difficult question. The introduction of the competitive grants program and the impetus for increasing that was the board's feeling that that was an area that didn't get enough emphasis. Really the proof is in the pudding. We need to have very good systems of evaluation to see that a mix is providing what we need. It's not inconceivable that as science changed, you might want to change the mix. It's also not inconceivable that the formulas that we use to grant funding, which are now 130 years old, might not need to be reconsidered. I think it's safe to ask the question.

Mr. ALLARD. So the basic premise on the formula funding is that we have different geographic areas that have different needs as far as agriculture, and we don't want one geographic or one area of agriculture neglected because of perhaps some geographic and climatic conditions and whatnot.

Ms. OFFUTT. Yes, it's the site specificity, but it's also the recognition that a lot of agricultural research has to be carried on over a long period of time. I was on the faculty at the University of Illinois where the Morrow plots have been continuously studied, the corn and soybean plots, for over 100 years. You get a lot of information if you have the security of that long-term funding.

Mr. ALLARD. My time is beginning to run out. I'd like to have each of you at the table submit in writing to this subcommittee some specific recommendations on what we can be doing in the 1995 farm bill to rectify some of the problems that you've talked about here today, if you would, please.

Thank you, Mr. Chairman.

Mr. STENHOLM. Ms. Lambert.

Ms. LAMBERT. Thank you, Mr. Chairman, and thank you to the witnesses for their testimony today.

Coming from a State where we have one of the earlier land-grant colleges, the University of Arkansas, and some tremendous studies going on as far as our workings in the new rice germ plasma center

and the fish experiment station, all of which come under the heading of many different departments and the influence of those different departments, and they do fit within the categories of what we are most prevalent with in the delta—rice and fish farming—it's interesting, and I'd like to ask Dr. Offutt, we talk about the input or the exchange between public and private and the need to get the knowledge out to the farmers, to the private people, and as we talk about a lot recently streamlining, reorganization, and some of the other areas where we want to make the services of USDA and other agencies more farmer-friendly and user-friendly, is there room perhaps for a closer marriage between the different public entities, whether it be the land-grant colleges and the universities as well as the different departments that are involved in the research centers that we have, to be able to collaborate and work more closely together, again, hopefully being more cost-effective and working a little bit closer as far as the different agencies are concerned? Has that been addressed?

Ms. OFFUTT. Well, clearly, the feeling that those kinds of gains in efficiency would be possible by reorganizing how agencies and institutions relate to each other was really behind what the board wanted to consider in a study of the land-grant colleges. Many of these colleges work, as you know, with funding from EPA, from DOE, from NSF, from NIH. So really they're not as parochial as the titles might sound at all, and there is much anecdotal evidence for successful collaborations set up along nontraditional lines, either between States, for example, or between colleges and other parts of a university. We are hopeful that by taking the national perspective, we'll be able to identify those kinds of collaborations that might work in a number of settings.

So I think the potential is there, and I would encourage you to ask the next panel this question as well, because they're the ones who have many centers and universities to work with. They would have a good perspective.

Ms. LAMBERT. Thank you.

I yield back the balance of my time, Mr. Chairman.

Mr. STENHOLM. Mr. Gunderson.

Mr. GUNDERSON. Thank you, Mr. Chairman.

Thank you all. I might be asking some very broad questions here, but I would like to get your comments on them. I'm hesitant to do this, because whenever you bring up some of these buzz words, you have an avalanche of reactions. I've experienced that in my years on dealing with ag research.

But I wonder if there isn't a real disconnect in ag research in this country right now. As I was listening to you all and reading your testimonies, it seems to me that there is a real disconnect between those who are doing the basic research and those who are really on the cutting edge of new technology in agricultural sciences. Probably I'm wrong, but if perception is reality, and I think it is, I have to tell you that perception's out there. I think there is a disconnect as well between what the publics do in basic research and what the privates are doing.

I think, third, there's a disconnect between academic research initiatives and, frankly, what the public wants, and I just get the feeling that the frustration each of you has echoed in a different

way in your report is because we've got a real schism developing in our country between the traditions of ag research which we have had, God knows, since land-grant colleges started and what is happening out there in the day-to-day realities of agribusiness and that whole area.

I look at your statements, and I can't disagree with you that we ought to have a national facilities plan, but I've got to tell you, if a national facilities plan means we're going to spend money just on land-grant colleges and giving them new, fancy institutions and we're not going to let anybody else into this ag research area, I think I'm opposed to that.

I understand your concern about competitive grants, but part of the reason, obviously, the Congress has gone to competitive grants is because we're increasingly uncomfortable with the results we're getting from formula grants.

I certainly agree, Dr. Savage, with your statement on earmarking, and yet, while earmarking might be half political, I've got to tell you I think the other half is congressional frustration that we don't have any results for all the money we spent.

So there seems to be, I think, a disconnect at least between you in the profession and some of us on this panel. I know there's a bigger disconnect, frankly, between you and academic research and those in agriculture in this country.

I've raised a lot of questions, and, frankly, I hope some of them were at least challenging, if not disturbing, but I'm not sure where all this leads us. Do you have any advice for us?

Ms. OFFUTT. As I said, the Board on Agriculture has been particularly concerned with this competitive grants area, which has turned out, if you look at the ag research budget, to be the most dynamic aspect in terms of a few gains in funding levels at the margin. What that modest success has apparently engendered is a focus of this controversy about what basic science is supposed to do and what farmers or groups of farmers might want on the question of how you allocate research dollars.

The board has discussed the idea of perhaps trying to get this dialog out in the open so we can try and understand the kinds of issues that you've raised. It's not obvious to everyone, and there's no reason it should be, how molecular genetics is going to help water quality, but the linkage is there in that program.

The board has spent some time talking to the chief scientists at the competitive grants program and also to the people who have been here to the Hill about how we might try and better define what concerns are and how the mechanisms really address them.

Mr. GUNDERSON. Any comments from the other two?

Mr. KLOEK. I guess I'd make a comment on a small part of that in terms of your disconnect. You commented on the perception of a disconnect between the applied research and the basic research. Close to half of the people who serve on the board are actively engaged in farming, either as their sole source of support or a significant part of it. In talking to those UAB members, I would conclude they don't see that disconnect. For example, we have a dairy farmer and he understands what the bST issues are, what it is and where it comes from. Other UAB farmers understand transgenic

plants, why this research is important and ultimately may have an impact on their profitability.

So it's been my experience that, if you go talk to the farmers and ranchers on our board, they don't see that disconnect.

Mr. SAVAGE. I guess my response would be that there has to be a serious understanding of what institutions are capable of, and one of the concerns that Members of Congress have about academia in general in a lot of areas is, how does it take basic research and transfer it? What is its responsibility? Some expectations may be out of line or are going to be unfulfilled because of what institutions are about, and you have to think in your legislation what other kinds of institutional processes might be available, what kind of intermediary associations. It might be between institutions that stress and reward basic research as opposed to the needs of the private sector.

I want to go back to the comment about the formula funding, and I think that basically what you're ending up with is a nondirected entitlement program. If you have particular problems, then you need to target them in your legislation.

If I could just say one thing about earmarking, it is a symptom of frustration, but you have to recognize what it does to create harm in its outcome and the fact that very few institutions participate in this process and that there's no determination of how these funds are used. What is the response to the taxpayer?

Mr. GUNDERSON. Just 30 seconds, because my time is up. I have to tell you that I desperately wish you and everybody who's testifying today would have come in here with a 21st century research plan. I've skimmed over your testimony and that to follow. It's pretty much protecting business as usual, and I think that's disappointing, and I think that's probably part of the disconnect.

I mean, whether we like it or not, whether it be in education, agriculture, the military, or health care, we've got to break the mold. I mean, business as usual doesn't cut it. It doesn't cut it with congressional appropriations, it doesn't cut it with public confidence, and I don't think it cuts it in terms of outcomes. In 1993 we ought to be doing something much more bolder than your testimonies advise. Thank you.

Thank you, Mr. Chairman.

Mr. STENHOLM. We've got another one of those important votes that is going to take us away from here in just a moment. Talk about disconnects around here. We've got them. But, anyway, let me ask a couple of questions before we have to go vote.

Dr. Kloek, you mentioned in your statement that you had written Senator Byrd on behalf of the UAB in 1991, expressing your disappointment that the Agricultural Research Facilities Planning and Closure Study Commission, which was patterned after the base-closing study that has been relatively successful in helping us deal with a very difficult situation in the military had not been funded. What was the answer you got?

Mr. KLOEK. None, I'm told. We did not get a response to that letter.

Mr. STENHOLM. So the Appropriations Committee chose to basically ignore your recommendation to fund what has been author-

ized, an in-depth study looking into this particular question, as far as you know?

Mr. KLOEK. Well, what I know is that they didn't respond to our letter. I don't know if they ignored it or not.

Mr. STENHOLM. How about Dr. Savage, Dr. Offutt? What's your opinion of the Agricultural Research Facilities Planning and Closure Study Commission that was recommended in 1990? Is that a good idea, or should we go back to the drawing board and make another recommendation?

Ms. OFFUTT. Well, whatever mechanism you use, it's certainly appropriate to ask whether the physical infrastructure fits the nature of the work you need to do. We know from earlier studies by the National Science Foundation that agricultural research facilities are very old and that this can create a problem in doing certain kinds of new science. So any kind of a systematic evaluation of what you've got sitting on the ground compared to what you have to do is useful. The question of how you got that done would have as much to do with the nature of the agreements that have to be made up here as anything.

Mr. STENHOLM. No, I understand that. I understand the politics of it. What I'm getting at is my colleague from Wisconsin's question and chastising somewhat you and everyone else that comes before our committee, as I understood what he was saying. What I'm asking for is, Dr. Kloek obviously recommends that it was a good idea. Do you agree with something along that line?

Ms. OFFUTT. Yes.

Mr. STENHOLM. And my question was, if not that, what?

Dr. Savage.

Mr. SAVAGE. I don't have a particular opinion on the issue. I don't have an opinion on that matter.

Mr. STENHOLM. In the interest of time, I've got several other questions that I'm going to submit to you in writing.

Dr. Savage, why do you feel personally that there has been an increase in earmarks over the last 12 years? What has caused this?

Mr. SAVAGE. I think that there's a breakdown in agreement among academic institutions that this in fact is a wrong practice, and that one institution sees another institution doing it and they go after it. There's a breakdown within the community. There's also a general sense that facilities are deteriorating and that something needs to be done. I'm not sure this is always well-expressed in terms of why the Federal Government should do this and what the Federal Government's responsibility should be, but there is that sense that the Federal Government does have this relationship and that there should be some sort of funding. And there's just a very strong needs-based concern here where other sources of funding—private, State—are drying up. State budgets are having very difficult times, and people look to the Federal Government for these kinds of solutions. So there are a number of reasons.

Mr. STENHOLM. Can each of you stay for a few more minutes? Will your schedules permit you to? If you have a problem, I'll excuse you, but if not, I'd like to ask you—we'll go vote and be back in about 5 or 10 minutes.

Mr. KLOEK. Mr. Chairman, I have a plane to catch.

Mr. STENHOLM. Then you will be excused. We'll submit questions to you in writing, Dr. Kloek.

Mr. KLOEK. Thank you.

Mr. STENHOLM. Thank you for being here, and we will be contacting you further. Thank you.

We'll stand in recess for about 10 minutes.

[Recess taken.]

Mr. STENHOLM. The subcommittee will come to order.

Dr. Offutt, some individuals advocate a more regional approach to the distribution of formula funding. Are the present efforts made on these lines adequate, or could they be increased?

Ms. OFFUTT. The board believes that there is probably the potential to increase the use of regional funding for agriculture. Right now, as you know, the formula research funds have a mechanism for funding regional research specifically, and one of the things we'd like to do in the study is look at the base of agriculture regionally and see how you might expand the use of regional mechanisms.

I was in Madison, Monday and Tuesday, and before that I had been down in Illinois, and one of the questions that came up, for example, is who should do dairy science work in the Upper Midwest. That's the kind of thing that you'd like to address. You'd like to know how many dairy cows there are and where they are and how that fits with the research structure.

So, yes, we think that there are probably great opportunities for that kind of collaboration.

Mr. STENHOLM. Dr. Savage, did you have a comment on that?

Mr. SAVAGE. No, sir.

Mr. STENHOLM. I want to take another run at the whole question of competitive grants. Should all grants be competitive and peer reviewed, or are there unique and special circumstances that would justify a grant from the U.S. Government to an entity without peer review and without benefit of competition?

Dr. Offutt.

Ms. OFFUTT. Yes, I think there are. The example I gave of the work on UVB radiation was a case in which the Federal Government has a policy or an interest in global change research and needed a specific kind of information to support our treaty commitments, and it's essentially a contract. It's like procurement for the Government, and that's a case in which implicitly, I suppose, you can say that peer review is performed when you let the contract. You look for the people to do the work, but it's not peer reviewed in the traditional sense.

So, yes, I think that's clearly a place, when there's a national priority or a need that needs to be filled very specifically, that you would not use peer review.

Mr. STENHOLM. Can you think of an example in agriculture? Now, that's one in which clearly the national interest is under review. Can you think of an example in agricultural-related activities in which a grant should be made without benefit of peer review or without benefit of competition?

Ms. OFFUTT. Well, again, the formula funds are not peer reviewed the way the competitive grants are, but there's review with-

in a station, for example, of how to allocate dollars. So there's some kind of quality control there.

Again, we can argue about how good the quality control is, but I think the basic premise of the formula funding, that there's a site specificity and a long-term element to ag research that distinguishes it from other endeavors, says that you might not want to have the same kind of peer review that you do with the competitive grants program.

Mr. STENHOLM. Dr. Savage.

Mr. SAVAGE. I think it's important to remember what competitive peer review and merit review mean. The term "merit review" was used instead of "peer review" after a while for political reasons, but the idea behind it was that there are any number of possible considerations, whether they be regional concerns, helping out particular regions, whether it be helping out, say, minority and female researchers, any sort of particular concerns in addition to, say, pure scientific merit, that could be identified. The point, though, of merit research broadly based is the idea that there is a review of all these different criteria that could be used to determine whether or not a particular entity should receive Federal funding.

So given that notion of merit review where there are any number of considerations that can be employed, as long as they're up-front evaluated, that would certainly clearly be my preference.

I think that earmarking in general reflects, on one hand, a very legitimate and constitutional right of the Congress, the legislative branch, to review the activities of the executive branch. The executive branch doesn't always use peer review, doesn't always use merit review. So sometimes things are included in the Federal budget proposal that in fact are the equivalent of executive earmarks, and sometimes maybe you need congressional earmarks to counter that practice. Just because it's in the President's proposal doesn't mean it's been merit reviewed. So I think as a legitimate counter, that's one consideration.

Mr. STENHOLM. If we were going to have a more accountable peer review for Congress in competitive grants, should we not apply the same criteria, the same accountability to anything that USDA might do?

Mr. SAVAGE. I would agree.

Mr. STENHOLM. My final question to both of you. Based on your intimate knowledge of the subject that we're talking about, my question is on accountability. On a scale of 1 to 10 on agricultural research, on accountability, if you were seated where the five of us are seated, having voted taxpayer funds for the research, on a scale of 1 to 10, how would you rate the accountability, the process whereby the funds that are expended are accounted back to the Congress?

Mr. SAVAGE. Which funds in particular?

Mr. STENHOLM. Any funding that is available. If you want to make a differentiation, do so. But I'm talking in general, all dollars expended for agricultural research purposes.

Mr. SAVAGE. I'd probably give it about a three, four maybe.

Mr. STENHOLM. Dr. Offutt.

Ms. OFFUTT. I think it definitely gets a higher mark than that. It's probably somewhere on toward five or six, I think, the question

of accountability. We have a lot of reporting in this system, and I know you probably have seen a lot of those documents. So if you measured accountability in terms of paper received——

Mr. STENHOLM. I hope we don't do that.

Ms. OFFUTT. I think it would be good to change the definition, because you might get a different score.

Mr. STENHOLM. Thank you.

Do any other members have questions? Mr. Kingston. Mr. Volkmer.

Mr. KINGSTON. Thank you, Mr. Chairman.

I just want to kind of ask that question again, maybe modifying it slightly. Are we getting our money's worth? If you were the one writing the check, would you continue writing it at current levels? What is your assessment of that? I mean, is it all spent very, very well, or half of it is and some of it isn't?

Ms. OFFUTT. In general, the returns to what is about $1.5 billion of Federal money in ag research, the calculation of the returns to that research are in excess of 20, 30 percent, some as high as 175 percent. The point is that as public investments go, agricultural research is a very good deal. That's not to say that there aren't dollars that we could reallocate that would even increase that investment, which is what we really ought to do. It's not sufficient to say it's very high. If we could increase it, we should.

So, yes, it's a good investment now, and I think the question is, how much better could we make it? But most of the empirical work that tries to measure this—admittedly, it's difficult—shows very high rates of return to public investment in agricultural research.

Mr. KINGSTON. Let me ask before Dr. Savage answers, if he wants to, do you have specific recommendations on those areas that we could get a higher yield, higher return on? And I apologize, you may have already spent an hour talking about those. Do we have something in the record that would be along those lines?

Ms. OFFUTT. I can provide the board's recommendations about how to allocate money across these six categories of national priorities, yes. We can provide that.

Mr. KINGSTON. Thank you.

Mr. SAVAGE. One of the reasons I gave a lower mark is because what you do have—agriculture is really unique amongst Federal research programs. One can make the claim, and researchers do, that they need long-term stability in their funding for biomedical research, for engineering research, for social science research, that we need to have data bases over a long period of time, and that, therefore, they should have formula-based funds for those. But agriculture is relatively unique, and it means that if you don't have competitive-based funding, then your ability to determine quality and evaluate it on a regular and fair basis is lessened.

So when you have a particular aspect of Federal programs, meaning agriculture, where so much of it is earmarked, so much of it is formula-driven, you're just not going to get the same necessary evaluation as other areas of federally funded research. So that's why I would give agriculture somewhat of a lower mark in perhaps some other areas. But simply because you put money in, you don't necessarily get an output. For example, one of the highest federally funded programs is the Cancer Institute, but there are a

lot of people who would say, "Well, we haven't cured cancer, have we? What are the processes?" I've heard Chairman Natcher go on about this, too.

So there's a difference between—you're always going to have an outcome, but at least you should have an evaluation process that says, "What we do do is the very best we can do, given human limitations."

Mr. KINGSTON. Thank you.

Thank you, Mr. Chairman.

Mr. STENHOLM. Mr. Volkmer.

Mr. VOLKMER. Thank you, Mr. Chairman. I'd like to start off with, in agricultural research, where are most of the funds? In other words, we have ARS, we have formula grants, we have competitive grants, and we have earmarked funds. Who gets most of the money?

Ms. OFFUTT. You mean in terms of the agencies to which it is appropriated?

Mr. VOLKMER. No. I'm talking between Agricultural Research Service, formula grants, competitive grants, and earmarked funds. If I put those all in a pot, who has the highest percentage of it?

Ms. OFFUTT. I'm not current on the budget numbers. My recollection would be that the Agricultural Research Service would be appropriated at least one-half of those funds.

Mr. VOLKMER. That's right. ARS gets most of the funding.

Ms. OFFUTT. Yes.

Mr. VOLKMER. And who does a peer review on ARS?

Ms. OFFUTT. I am not in a position to answer about the ARS procedures on peer review. I don't have direct knowledge of that.

Mr. VOLKMER. I don't think there is any.

Mr. SAVAGE. Let me answer your question——

Mr. VOLKMER. I mean, it's the people in-house that make the determination as to what research——

Ms. OFFUTT. There are reviews of ARS projects.

Mr. VOLKMER. Pardon?

Ms. OFFUTT. There are reviews of ARS projects, certainly, based on the merits of the project and how it relates to national goals.

Mr. VOLKMER. By whom?

Ms. OFFUTT. Again, my understanding is that it would be by the Agricultural Research Service scientists. The extent of outside participation, I can't speak to. Perhaps our next panel could, but I don't have direct knowledge that's useful about this.

Mr. VOLKMER. Well, you see, we get criticized for what the Congress does on earmarked funds because basically there's no peer review, and even on some, like one that I'm familiar with, they have in-house peer review to determine what projects they will fund among the 18 or so universities out in Arkansas and stuff and set up out through the Midwest, and that's still criticized because that's in-house peer review, but yet the largest funds that go out in Agricultural Research Service, ARS does not have, as far as I know, outside peer review to determine whether or not those projects are worthwhile, that's what we need for the future in agriculture, and that they are actually accomplishing what they propose to do in the research. It's all done in-house.

Now, that hasn't necessarily worked bad. I'm not necessarily criticizing it, but I want you to think about it when you criticize other things just because they don't have peer review.

Mr. SAVAGE. If I can address your question, sir, first of all, in terms of who gets what, in terms of earmarked funds, for fiscal year 1992 there are about $146 million. Ten schools received one-half of those funds.

In terms of whether ARS peer reviews, as I indicated to the chairman, there are many executive programs. Just because it's in the Federal budget proposal by the President does not mean it's been peer reviewed. I think that the question of competitiveness and merit review should be extended to all Federal programs. That would be my position. So if you're critical of ARS because they're not merit reviewed, then I think your criticism——

Mr. VOLKMER. I'm not critical. I'm just raising a point. I don't think that you can say that ARS hasn't done good agricultural research in the years that they have. I think they have. I'm just trying to point out that just because you have peer review doesn't mean, in my opinion, that you have good research, and just because you don't have peer review doesn't mean you don't have good research. That's what I'm trying to point out to you.

I'll go one step further. As I've toured my district over the many years, and I've been in the Congress 16 years, you know the only complaints that I've had are about research? You know where it came from? You know who funded it? NSF. Some of their grants about flies and about pigeons and things like that that get written up in Reader's Digest and places, but I get criticized for. I've yet to hear a criticism for an agricultural research project.

NSF's peer reviewed. Correct?

Mr. SAVAGE. Golden Fleece Award.

Mr. VOLKMER. All right. Now, what do we do about projects that some of us here in the Congress think are very worthwhile that are not eligible for competitive grants or formula grants and ARS doesn't do them? What do we do?

Mr. SAVAGE. I think that what you do is you work with the institution or the researcher and that you encourage the program itself to recognize those kinds of projects. The project might not get funded in the immediate year, but over time, if the program is broadened to encompass that kind of research, it eventually will be funded.

Mr. VOLKMER. I have to persuade the bureaucracy to enlarge competitive grants to include it and let them compete on an area in which the people in the bureaucracy don't think is appropriate, and I do.

Mr. SAVAGE. You can do that legislatively, yes.

Mr. VOLKMER. Pardon?

Mr. SAVAGE. You can do that legislatively, yes.

Mr. VOLKMER. Yes. So then instead of earmarking the funds, I earmark what they're going to do with the money.

Mr. SAVAGE. But you do that already through authorizations.

Mr. VOLKMER. Yes. In a broad outline, that's correct. Well, maybe I can get on my soap box just a little bit more. If you know, where did we have the problems in use of funds for facilities rather than research and for operational costs that some of us thought were

very exorbitant? What area was that? Wasn't that NSF, Stanford, places like that? A large amount of funds, peer review went for buildings, went for equipment, all kinds of stuff, high utility bills, everything else. We in the Congress had to finally act on it. That was all peer reviewed. What's your answer?

Mr. SAVAGE. It's part of Congress' responsibility to oversee these kinds of activities. Part of the reason Stanford had problems was because the way Federal research money is administered is that universities are divided up among cognizant agencies, and Department of Defense was well-known amongst the university community for being very lax in its oversight, so Stanford got away with a lot of things that some of the other institutions——

Mr. VOLKMER. Not just Stanford, though, either.

Mr. SAVAGE. No, it wasn't. But oversight is part of the ongoing responsibility.

Mr. VOLKMER. One last question, Mr. Chairman, if I may.

Let's again look at both competitive grants in agriculture and look at NSF. I guess we could even look at NIH, but NSF especially. Where do most of the moneys go? Are these pretty well spread out among all of the universities like in competitive grants in agriculture? Do they go to all of the agricultural universities pretty well evened out, spread out, or do they go to certain ones out here?

Mr. SAVAGE. There's obviously a hierarchy where some institutions get more of the funds than others.

Mr. VOLKMER. And isn't it true in NSF?

Mr. SAVAGE. It's true with all.

Mr. VOLKMER. I mean, we don't get many NSF funds out in the Midwest in comparison to the east and west coasts.

Mr. SAVAGE. Well, there are also more universities and also more scientists per capita on the east and west coasts.

Mr. VOLKMER. Thank you, Mr. Chairman.

Mr. STENHOLM. Thank you.

We thank the panel very much for their testimony today. As all of us have stated, this is an idea whose time has come. This is a subject whose time has come. There are going to obviously be changes, we hope, for the better. That's what you want, too. That's what you've testified. That's what you work toward on a daily basis. We hope and expect that you will be a constructive part of this subcommittee's oversight responsibilities as well as our attempts to, as you said, Dr. Offutt, take the best system in the world and make it better, and that's the challenge we have.

We thank you for being here, and we look forward to working with you in the future. Thank you very much.

Ms. OFFUTT. Thank you.

Mr. STENHOLM. We'll call our second panel: Doctors Carpenter and Fischer, Mr. Guernsey, Dr. Mortensen, Dr. Topel, and Dr. Foil

Our first witness will be Dr. David Topel, dean, college of agriculture, Iowa State University.

Dr. Topel.

STATEMENT OF DAVID G. TOPEL, DEAN, COLLEGE OF AGRICULTURE, IOWA STATE UNIVERSITY, AND CHAIRMAN, BOARD ON AGRICULTURE, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Mr. TOPEL. Thank you, Mr. Chairman. It's indeed an honor to be with you this morning. My name is Dave Topel, and I'm pleased to provide testimony on behalf of the National Association of State Universities and Land-Grant Colleges Board on Agriculture. The board is composed of representatives from agricultural experiment stations, cooperative extension, agricultural international programs, academic programs, the Council of Administrative Heads of Agriculture, 1890 universities, research and extension, forestry, home economics, and veterinary boards from the Commission on Food, Environment, and Renewable Resources.

Some of the colleagues on our board could not be with us today, and I'd like to present you with written testimony from Peter Magrath, Monika Escher, Barbara Stowe, and Tom Vaughan. Monika represents the international programs; Barbara, home economics; and Tom Vaughan, veterinary medicine. Dr. Magrath is president of NASULGC, and due to schedule conflicts, he could not be with us. He's sorry that he could not participate today, but he has prepared a written statement that we'd like to submit in testimony.

Mr. STENHOLM. Without objection, their prepared statements will appear in the record.

Mr. TOPEL. Thank you.

[The prepared statements of Mr. Magrath, Ms. Escher, Ms. Stowe, and Mr. Vaughan appear at the conclusion of the hearing.]

Mr. TOPEL. The NASULGC Board on Agriculture is pleased to participate in the hearings on USDA priorities for research and education and offers its full cooperation and expertise to the process. The board views the testimony process as an opportunity to strengthen and improve the Federal Government-university model of interaction and collaboration which has proven so successful over the past 130 years. It is a unique model and is envied worldwide, but it can and should be modernized to meet changing world conditions. The Secretary's call for a science-based USDA emphasizes again the contributions of the Federal-university partnership in science and education, which has promoted competitiveness, enhanced rural development, and improved safety and wholesomeness of the U.S. food supply.

The unique Federal–State partnership was bonded together by sharing financial responsibilities by formula funding. The success of the land-grant university system in the 21st century will depend on the success of that financial bonding between Federal and State sources. Base funding for future programs in land-grant universities is essential. A balance, of course, between base funding, formula funding, special grants, and competitive grants is important as a new foundation is established for the land-grant university systems in research and education.

The basic science and education functions of the USDA—research, extension, and education—merit close attention, and priorities for each division should be coordinated by one agency for improved efficiency and a more effective delivery system. In the new

world economy, competitive advantages for the United States will depend on maintenance and enhancement of our ability to generate and use science, technology, and education. Because of the long history of USDA in these areas, future priorities should build on these advantages.

I'd like to share with you a few examples. American agriculture must continue to lead the world in adoption of science and technology in order for the American public to enjoy continued benefits, and the American economy to prosper. You cannot have a strong Nation without a stable food supply. You understand that as members of this committee, but millions of Americans take this for granted.

A better trained and educated workforce must occupy a high priority in rebuilding rural America. We must introduce improved methods for rapid technology transfer to rural America, methods such as improved fiber optics networks and improved satellite networks where we can transfer technology from the universities and technology centers to the homes of farmers, to the offices of agribusinesses around the country and, for that matter, around the world.

There must be an increased role of the USDA in undergraduate, graduate, nonformal, and extension education to address the specialized needs of agriculture, natural resources, and family and consumer affairs. We need improved distance learning programs for agriculture, programs that will allow farmers and other agribusiness leaders to take courses for credit so they can work on advanced degrees while continuing their full-time employment.

We need increased interaction and collaboration between science and education communities and USDA agencies, such as Human Nutrition Information Service, Soil Conservation Service, Farmers Home Administration, Forest Service, National Ag Library, Food Safety and Inspection Service. Linkages between these units and the land-grant university system is essential. The National Ag Library could take on this project and connect these units more effectively through computer networks and related areas.

Continued and enhanced collaboration with other Federal agencies and Departments outside of USDA, such as EPA, Energy, Interior, HHS, Commerce, Labor, NIH, and NSF, is essential, and we need to capitalize on these cooperative ventures between scientific communities.

In light of the above, and with particular attention to the opportunities and mandates emerging throughout Government, the U.S. Department of Agriculture, as it relates to the science and education agencies and the land-grant university system, should take note of the following principles when establishing new priorities.

Now more than ever, there is a need to retain flexibility for change and focus on enhancing the ability of the Department to anticipate and respond to critical issues in a timely manner. In order to anticipate critical issues in a timely manner, it is important to have input from grassroots organizations, such as the Council for Agriculture Research, Extension, and Teaching. Bob Guernsey is past chair of this council and will report his thoughts to you during his testimony.

Extension, research, and education efforts of the USDA should emphasize rural development and revitalization as well as an environmentally sound and internationally competitive production agriculture. The USDA-land-grant university partnership must now respond to the greater and more complex issues of agriculture, environment, and social/economic rural infrastructure. We should expand our traditional resource base and work directly with professional organizations and individuals with experience on environmental and social issues as programs are established for rural development or policies are established on environmental topics.

The NASULGC Board on Agriculture's statement provides general and overall concepts for consideration. Representatives of the NASULGC board who will follow this testimony will provide more specific recommendations for research, extension, instruction, and international programs.

Thank you for the opportunity to present a statement on behalf of the NASULGC Board on Agriculture on the priorities for research and education for the U.S. Department of Agriculture.

[The prepared statement of Mr. Topel appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you.

Next we'll hear from Dr. Zerle Carpenter, director of Agricultural Extension Service, Texas A&M University.

STATEMENT OF ZERLE L. CARPENTER, ASSOCIATE DEPUTY CHANCELLOR FOR AGRICULTURE AND DIRECTOR, TEXAS AGRICULTURAL EXTENSION SERVICE, TEXAS A&M UNIVERSITY, AND CHAIRMAN, EXTENSION COMMITTEE ON ORGANIZATION AND POLICY, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Mr. CARPENTER. Mr. Chairman, members of the subcommittee, I am Zerle Carpenter, and I'm director of the Cooperative Extension System in the State of Texas. I also have the privilege of serving as the current chairman of the Extension Committee on Organization and Policy, commonly referred to as ECOP, with the National Association of State Universities and Land-Grant Colleges. On behalf of ECOP, it's my great pleasure to take part in this hearing to discuss the role and functions of the Cooperative Extension System.

Mr. Chairman, in the interest of time, I will only emphasize some of the highlights of my prepared text and, with your permission, would like to submit a more detailed statement for the record.

Mr. STENHOLM. Without objection, your prepared statement will appear in the record.

Mr. CARPENTER. Mr. Chairman and members of the subcommittee, as you know, the Cooperative Extension System, or CES, links USDA to the people and communities in almost every county of the United States. They link these through the land-grant universities in the 50 States, six Territories, and the District of Columbia. Its mission is to help people improve their lives through a dynamic, multifaceted educational program that focuses scientific knowledge on contemporary problems, issues, and needs facing people, businesses, and those communities.

Mr. Chairman, the Cooperative Extension System differs from a line agency. Rather, it's a three-way partnership between the Federal Extension Service at USDA and State and local units of government through the land-grant universities in each State. This partnership results in three-way leveraging of the Federal investment through State and local funding for research, extension, and education. In fact, currently, it's my understanding in the current budgets there's about $400 million through the Federal Government and about $1 billion through the local and State government. In fact, the headquarters unit of ES–USDA, that coordinating unit for the National Cooperative Extension System, consumes less than 4 percent of the funding of the Federal appropriations, the remainder going for this leveraging through the State and the local community.

The Extension System's program priorities are identified with and for local people. They provide about 70 percent of the program's funding through these State and county levels of government, and it is the people's link with the total resources of the university and with Federal research. At the same time, the Federal component, ES–USDA, of this cooperative structure provides a coordinated approach to meet these national priorities.

Strategic planning is an ongoing activity in the Cooperative Extension System. National leadership for strategic planning in the system is provided by the Strategic Planning Council. This council is a key group in synthesizing information about the future, the societal environment, and the capacities of the system. It identifies and assesses issues consistent with Extension's mission. It solicits and synthesizes information from futuring panels, external scanning processes, and national advisory councils. At the State and county levels, similar structures and processes are in use to involve citizens, staff, and relevant collaborators in strategic planning.

Mr. Chairman, the results of these are included in a futuring report over the last several years, "Patterns of Change: Strategic Directions for the Cooperative Extension System," and then at the State and local level, "The Strategic Planning Process." I'd submit to you that these aren't just more stacks of paper, but they are in fact in process, guiding the total Cooperative Extension System.

To remain relevant and to meet constantly changing needs of the people, we must continue to work cooperatively with numerous other agencies and groups who are also now networked technologically so as to draw better on the appropriate research, disciplines, and data bases.

Over the past several years, the system has undergone a great deal of transition. "Change" has been the operative word throughout the Cooperative Extension System. The focus of this change has been made to move toward issue-based programming. As a result of this change, some critical issues face the system. Among those issues are some of the following that you would recognize.

With increased intensity of the strategic planning process to identify the most sensitive and critical issues, we've refocused some resources on issues affecting agriculture, children, families, environment, and consumers. The most highly visible current programs focus on societal issues that relate to agriculture and consumers,

such as food safety, water quality, waste management, sustainability, and global marketing.

As this transition has occurred, there's some lack of public understanding of the new agenda focusing on critical issues. This lack of understanding leads some members of the media, national organizations, public officials, and, yes, some of our own employees to make statements that reflect the CES of the past instead of the current program focus. We understand that transition results in some miscommunications. The Cooperative Extension System, though, has had a long tradition of effectively educating many segments of society in programs that relate to agriculture, families, youth, and communities, and it has an extensive infrastructure which can and should be used by other segments of government.

For the future, the Cooperative Extension System continues to mature as a sound, proactive, nonformal educational system dedicated to the improvement of the lives of people by addressing critical issues and needs, and it continues to look to the future in hopes of continuing to be recognized as a positive force for change in the United States.

Mr. Chairman, Extension's interest in the potential restructuring of USDA is based upon the need to effectively fulfill the educational mission of a broad-based program driven by people's needs. State structures delivering cooperative Extension programs vary widely, and, thus, any structure at the Federal level should focus on the agency's ability to maintain effective linkages to the State programs. Moreover, we believe that there are a number of principles to consider in any structural reorganization. Mission and function should be the primary criterion for any reorganization.

Mr. Chairman, the Cooperative Extension System has examined some of the various possibilities for restructuring, and in my formal statement I have included some of the comments, both positive and some of the concerns, associated with each of these. The research, extension, and education functions have many commonalities, both in constituencies and in functional relationships. Therefore, the structural relationship should support this collaboration and cooperation among all relevant units both within and outside the Department.

We have submitted testimony that relates to possibilities for restructuring in which Extension Service-USDA would be a subcabinet unit with regulatory and service agencies. We understand that we are located in those communities, but would be very concerned about the potential to restrict the programs to agriculture and reduce current collaboration with other Federal units. There would be a strong potential for reduced State and local government and clientele support if they perceive that their broader expectations beyond farm programs will not be met.

Another model would be placement similar to that in which it's currently placed with science and education. There is an importance of science-based and user-driven research, extension, and education programs. We believe that this enhances the transfer and application of relevant technology from the several research units within the USDA.

If, in fact, finally, as ECOP has suggested, the Department is to be restructured based upon function, then there is a possibility of

that function of education, information, and outreach unit of the USDA in which it might be possible to place the Extension System in that category. There would be, then, a consistency of a reorganization based upon function.

Mr. Chairman, it's important that the placement of the Extension Service-USDA, its relatively small headquarters unit located within the Department, in any Federal structure, that this be designed to recognize the Federal, State, and local partnership and the best interests of the people in every State, and in your districts, who support the broad-based program of extension. Regardless of the structure that evolves, the Cooperative Extension System will support the decisions of Congress. We'll cooperate in every way possible to enhance the Department. After all, we are commissioned to serve the people.

On behalf of ECOP and the Cooperative Extension System, I thank you and the members of the subcommittee for allowing me to testify today. We'll look forward to working with you and your staff on what we consider to be one of the most important issues this subcommittee will address in the 103d Congress.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Carpenter appears at the conclusion of the hearing.]

Mr. DOOLEY [assuming chair]. Thank you, Dr. Carpenter, for your thorough comments, and we'll have some questions at the conclusion of the rest of the speakers.

At this time, I'd like to call on Dr. Fischer.

STATEMENT OF JAMES R. FISCHER, DIRECTOR, AGRICULTURAL EXPERIMENT STATION, CLEMSON UNIVERSITY, AND CHAIRMAN, EXPERIMENT STATION COMMITTEE ON ORGANIZATION AND POLICY, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Mr. FISCHER. Thank you, Mr. Chairman. My name is James Fischer, and I am dean and director of the South Carolina Agricultural Experiment Station, located at Clemson University. This year I have the privilege to serve as chairman of the experiment station committee on organization and policy of the National Association of State Universities and Land-Grant Colleges.

My written testimony discusses research priorities in the context of improving the functional relationships of the U.S. Department of Agriculture and the State agricultural experiment stations. In this respect, the analysis considers four key issues: First, to understand the goals of improving the efficiency and the effectiveness of the U.S. Department of Agriculture; second, to define the present State agricultural experiment station for meeting these goals; third, to identify those functional areas where change will improve performance of the State agricultural experiment station and USDA partnership; and, finally, evaluating for redirecting to improve the functional relationships.

In the oral hearing, I wish to emphasize the key issues that you delineated in your letter of invitation for this testimony. Under that, the first issue we considered was the optimum means of funding. The point that I wish to emphasize, given the earlier discussion, is that funding of agricultural research requires a balance in

its funding. There is funding that we must be involved in in the basic discovery of some knowledge to the transfer and getting that knowledge applied in the linkage through the Cooperative Extension System. This balance is critical for us to maintain.

Presently, at the Federal level, there are three mechanisms of funding: First, the National Research Initiative, which was discussed earlier, and this initiative was recently created and authorized by Congress in the 1990 farm bill. It recognized the need for infusion of research focused mainly at the discovery level.

Second is the base program or the formula funding. These funds are vital for our State-Federal partnership and allow for the State-level implementation of national strategies. I wish to point out that in association with these base funds or formula funds, these are peer reviewed and are evaluated into their various appropriate allocations at the individual State levels.

The third source of funds that is coming presently from the Federal system is the special grants. Special grants are an underused opportunity, in our estimation, for the Federal system to focus on some short-term emergency issues that require a focused research effort. We would like to propose a new type of special grant for contract research, and if it is your pleasure, Mr. Chairman, I would like to introduce into the record as an attachment to my prepared statement a copy of a concept for special grants contract research.

Mr. DOOLEY. We'll welcome that.

Mr. FISCHER. As you pointed out earlier, Mr. Chairman, the Agricultural Research System has been successful, and we are very excited to work with you and your committee in looking at how we can improve it and how we can make it better. The question comes, then, what combination of these funding mechanisms that I pointed out are the optimum?

First, I would like to point out that in science and education, we are very pleased that it has been identified as one of the growth areas in the Clinton administration. We are obviously pleased at the proposed growth in the National Research Initiative that is not at the expense of any of our other programs that are presently underway, and, in addition, the reasonable growth in our formula funding that maintains the State-Federal partnership.

There is an opportunity for us to look at some of the noncompetitive special grants or the funding that are addressing some of these national issues and how perhaps we can improve some of their effectiveness and efficiency. In many of the States, I wish to share with you, Mr. Chairman, we are restructuring and downsizing our systems because of the severity of the State budgets. We are somewhat in the same net-sums game that you are here at the national level, and we are sensitive to that and desire to work with you to work through how we can make this system more effective.

Concerning priority setting, there is nothing that we can think of on the research side that is more important both at the State and at the national level. The written testimony provides details on the priority setting, but I wish to, if I may, add to the written testimony additional issues relevant to the priority setting of the State agricultural experiment station entitled "Strategic Planning, Priority Setting, and Response to Changing Times."

This priority setting, this strategic planning that we are very much involved in at the State and the national level involves many stakeholders, both from the consumers of our end research product, or, if you will, the consumers of the food products which our research produces, to the producers and the farmers who are involved in enabling us to be one of the most effective agricultural production systems in the country. We seek consensus in a network of the State agencies and the Federal agencies.

All of this comes together, including the ARS, or the Agricultural Research Service, component and other science and education agencies, under the auspices of the National Research Council of the Joint Council. This priority setting drives our budget recommendations from NASULGC to the USDA. The product of this planning is the highly selected initiatives in research with rank order priority. In addition, we have identified those research objectives describing how to meet these goals, and, finally, we identified the resources required.

The next question that is presented to us is the percentage of fundamental, applied, and mission-linked research. I would start by saying that the Federal system has had a unique opportunity of leveraging over $2 billion in agricultural research activity for an investment of approximately some $430 million from CSRS. This is the unique opportunity—32 percent investment by the Federal system in this State-national–USDA Ag Research System. Of the investment from the CSRS of over $400 million, approximately 50 percent of that is formula funding, and a little over 20 percent is from the National Research Initiative. If your committee desires additional information on that, we would be pleased to present it to you.

From my personal opinion, having worked at four different land-grant universities in this Nation, I would give you a personal perspective on what I would estimate the breakdown of how the funds in the State agricultural experiment station system are spent on breakthrough research, applications research, and that which sits in between, and, again, in this continuum of a perspective from when we start generating the knowledge to when we've got it in the field, if you will.

Basically, in my experience, I would say that about 25 percent of our funds are spent in developing this breakthrough technology, and about 25 percent is spent making sure it gets applied in the field, and this is in close linkage with the Cooperative Extension System. The in-between now is about 50 percent of our funds are spent in between the breakthrough and the application. Keep in mind that in a lot of instances, this might be the same scientist that's working in the fundamental and working in the applied in a team effort with a lot of other discipline scientists.

I would underscore for you, sir, that all of the research that is done in the State agricultural experiment station system is targeted, is mission-oriented, is looked at solving some problem or enhancing some characteristic in the agricultural arena.

Well, then, how should this distribution differ, if it should? Keep in mind that in the response to this, there would be quite a variable if were to ask each of the Directors of the State agricultural experiment station system because of some of the issues discussed

earlier relevant to the needs in each individual State and the resources available and the competitiveness of those various States.

Applied research on the application end, as you could imagine, tends to be more specific. It makes this more targeted funding State funding, and the majority of the present investment tends to be by the States in the applied arena. The National Academy of Sciences' National Research Council study and subsequent interpretations suggest that an underinvestment at the discovery or breakthrough level is in existence in this Nation, and perhaps this is a role for the Federal Government.

But keep in mind in light of the earlier discussions that we do not want to sell short the formula funding, because these funds are the unique feature that maintains the glue of the State-Federal partnership, and they must be maintained and with inflationary offsets.

Special grants, if not confused with the pork barrel funding, offer a mechanism to focus the highly specific, short-term research on national priorities.

Relevant to the question of the linkage with proactive roles for extension and teaching, we have discussed this earlier, and it will be discussed further, and I would like to add that the research programs integrated with maintaining and enhancing the academic programs, creating the next generation of agricultural scientists and the extension programs and getting the technology out has to be linked together if our system is going to continue to have the success it has had.

Mr. Chairman, one of our challenges at the State universities is not different than what you're facing at the national level: How do we adapt to our changing needs of society? We have been working on this in the experiment station system since 1984 and have each 4 years come out with a research agenda strategic plan at the national level that sets out our priorities. In addition to those at the national level, the four regional associations of State agricultural experiment stations publish their strategic plan and how they take these national issues and bring them to a regional level of what's critical at the regional level.

We need perhaps to better address some of the expanding expectations that are put on us at the State agricultural experiment stations, and we are trying to do so, and with this committee's assistance in looking at how there are better ways to do so, we would like to be very much a participant in that.

I would share with you that trying to change at this time, when we've had a 20 percent reduction in science power at the State level, is putting a challenge upon our system also in the budget situation we face. We need to do some better planning perhaps with our budgetary linkages and how the Federal agencies that are involved in conducting research for agriculture that are beyond agriculture in the traditional agriculture department, how we can link better with the EPA, with the DOE. We are making strides, we are moving in that direction, and the assistance and ideas of this committee would be very much appreciated.

Mr. Chairman, I want to thank you for the opportunity to respond to these issues and will be happy to respond to any questions later.

[The prepared statement of Mr. Fischer appears at the conclusion of the hearing.]

Mr. DOOLEY. Thank you, Dr. Fischer.

At this time, we'll call on Dr. Mortensen.

STATEMENT OF JAMES H. MORTENSEN, ASSOCIATE DEAN, RESIDENT EDUCATION, PENN STATE UNIVERSITY, AND CHAIRMAN, ACADEMIC PROGRAMS SECTION, BOARD ON AGRICULTURE, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Mr. MORTENSEN. Mr. Chairman and members of the subcommittee, I'm Jim Mortensen, chairman of the academic programs section of the board on agriculture, National Association of State Universities and Land-Grant Colleges. I'm very pleased to have this opportunity to participate in these hearings regarding priorities for the USDA of the future.

Recently, the Federal Coordinating Council for Science, Engineering, and Technology, FCCSET, and the President's Council of Advisors in Science and Technology, PCAST, issued their reports dealing with the relationship of the Federal Government to research-intensive universities. Two recommendations from the reports demand your attention.

First, from the PCAST report, "The Federal agencies should ensure that their programs encourage universities to reemphasize education rather than discourage them," and from the FCCSET report, "Federal agencies should examine the impact of Federal research support on university undergraduate and graduate education and identify strategies to ensure against unintentional degradation of the educational mission and excellence of the research-intensive universities." With these recommendations we strongly agree.

The Federal agency link with higher education is especially critical to American agriculture. The American food and agricultural system is the world's largest commercial industry, with assets exceeding $1 trillion. This great size and the system's very favorable competitive position in the world economy is due in large measure to our ability to substitute scientific knowledge for natural resources and labor.

Thus, a strong case can be made for the fact that the most critical challenge to the food, agricultural, and natural resource system in the 1990's will be attracting and educating the requisite human resources. Not enough talented college graduates in the food and agricultural sciences are being produced to fill highly important roles in business, science, and environmental management. Of course, the contribution of State funds for the education of undergraduates in the food and agricultural sciences is enormous. Yet critical catalytic Federal funding is necessary to encourage innovative cooperative programs at our colleges and universities.

The office of higher education programs of the cooperative State research service is key to the continued improvement of the quality of higher education in our Nation's colleges of agriculture, and this continued improvement in the academic programs is a national need of great importance if the USDA is to continue to address the needs of an environmentally sound, economically significant Amer-

ican agriculture in order to ensure our continued supply of high quality, safe, affordable food for the American consumer.

The office of higher education programs administers competitive grant programs such as institutional challenge grants, institutional capacity-building grants for 1890 land-grant institutions, and national needs graduate fellowships grants. In addition, we are collaborating with this office to develop a minority scholars program to help attract qualified minority scholars to agriculture and the agricultural sciences.

Secretary Espy has called for a new USDA which is science-based and user-friendly, a Department that utilizes the newest and best science and technology to solve human problems. We concur. Therefore, our recommendation regarding the priorities of the new and visionary USDA is a call for ascendence of higher education in the form of increased support for its office of higher education programs. Inherent in this suggestion is the expectation that the Assistant Secretary for Science and Education will play an increasingly important role in agricultural, environmental, and rural development policy.

The Joint Council on Food and Agricultural Sciences, under the direction of the Assistant Secretary for Science and Education, has been the interface for policy discussions between the land-grant community and the USDA science and education Administrators. The priorities developed each year by this council play a significant role in directing USDA and land-grant colleges of agricultural activities. A continued and expanded role for this congressionally mandated joint council should be a priority for the USDA of the future.

In addition, we recommend that the new USDA make a very special effort to forge a closer link between the mutually agreed-upon priorities of the joint council and subsequent USDA funding.

Finally, we would like to point out that the functions of research and teaching, whether formal undergraduate education or nonformal extension education, are complementary activities and are best organized in conjunction with each other. Thus, any discussion of priorities should thoughtfully consider the necessary close working relationship of research and education.

Again, I appreciate the opportunity of participating in these hearings and pledge to your subcommittee the support and expertise of the academic programs section of the NASULGC Board on Agriculture.

Thank you.

[The prepared statement of Mr. Mortensen appears at the conclusion of the hearing.]

Mr. STENHOLM [resuming chair]. Thank you.

Mr. Guernsey.

STATEMENT OF ROBERT GUERNSEY, PAST CHAIRMAN, COUNCIL FOR AGRICULTURAL RESEARCH, EXTENSION, AND TEACHING

Mr. GUERNSEY. Mr. Chairman and members of the subcommittee, I am pleased to appear before you today to offer comments on the science and education priorities of USDA. I am Robert Guernsey, a farmer from Indiana. I have a family operation where I

produce hogs, beef, corn, and soybeans. Today, I come before you on behalf of the Council for Agricultural Research, Extension, and Teaching, better known as CARET, where I currently serve as the past chairman.

CARET is a national voluntary citizens organization whose grassroots membership is comprised of such individuals as agricultural producers, commodity leaders, agribusiness leaders, State and local officials, homemakers, consumers, and members of agricultural advisory boards. Each State and territory is represented by at least one delegate. CARET was established in 1982 as a mechanism through which citizen support could be expressed for agricultural research, extension, and teaching programs of the land-grant university system.

I, like all other CARET members, have greatly benefited from the unique partnership between USDA and the land-grant university system. Without the assistance I have received during my more than 30 years of farming, I doubt that I would have the kind of farm operation I have today. Through assistance from Extension and resources at my land-grant university, I computerized my operation early on in the 1980's; I have consistently cut down on the use of insecticides; I am using herbicides in a manner that is sensitive to the environment; I am learning to apply fertilizers in a more safe and efficient manner. This assistance allows me to continue to manage my farm business while adjusting my products to meet the needs of consumers and to comply with farm program regulations.

Our farm operation consists of my wife and I, our son, and his family. If I had to rely on professional consultants to assist us in some of the decisions that we must make on a regular basis, our costs would escalate. We would not be able to avail ourselves of the new scientific knowledge and technology in our farming efforts.

As the present debate ensues on how USDA should look, what its priorities should be, and to what extent its programs should be funded, we, in CARET, have the following concerns: One, that the base programs of Hatch, Smith-Lever, and so on be strengthened; two, that the Extension Service remain one of education and outreach; three, that an effective balance be struck between basic, applied, and mission-linked research; four, that agricultural academic programs be strengthened within the Department of Agriculture; and five, that these agricultural research, extension, and teaching programs be allowed to respond to current, as well as future, concerns of both the producer and consumer, such as food safety, water quality, genetic-engineered plants, youth at risk, and family problems, to just name a few.

Now, relating to those five categories, one, the strengthening of base program funding of Hatch, Smith-Lever, the 1890's, Morrill-Nelson, and McIntire-Stennis, is CARET's No. 1 priority. These programs provide the infrastructure to the agricultural research and education programs. Base programs guarantee that there will in fact be a continuing agricultural research and education effort at our land-grant universities. Without base funding, without these base programs, States would not have the necessary flexibility in responding to ongoing needs or situations of crisis. I might add that in responding to questions, I would be willing to respond with

examples of flexibility. Competitive and special grants, while extremely important and essential, do not and cannot, by their very nature, provide the ongoing attention that is necessary. Research, by its nature, requires a long-term effort that does not produce results overnight.

Two, CARET believes that Extension must be inextricably linked to the agricultural science and education efforts of our land-grant universities. In order to remain competitive, we, the users, depend heavily on Extension because the transfer of technology takes place through this mechanism. Without the education and training we receive from our Extension Service, we could be cut off from advances being made through the research done on our own or neighboring land-grant campuses. We, in CARET, would be very concerned if Extension were seen as a part of any farm program or regulatory effort. The whole community—the young, the senior, the rural, the urban—and local government feed upon the knowledge and resources flowing from our land-grant institutions.

Three, a strong research effort provides the foundation for any scientific and technological advances. We, in CARET, would urge a balance between basic, applied, and mission-linked research so that the needs of all kinds can be met. Because of the diverse needs of our society, we would urge that multidisciplinary research efforts be increased. Knowledge gained from basic research is distributed quickly and widely, but it is the competitive application of applied research that gives me the cutting edge in global competition.

Four, well-educated people guarantee the continuation of new knowledge and progress. It is, therefore, important to CARET that the higher education programs housed within USDA be strengthened. These Federal dollars are multiplied many times by State and private dollars while securing high-quality talent for the future. This partnership of leveraging support allows entry into the higher education system of the land grants by individuals, regardless of economic or social status.

Five, in order for any of these agricultural research and education efforts to be effective, they must respond to the needs of the American people. We need to continually strengthen the partnership between the user and the researcher so that the right questions are asked and the right problems are worked on for solutions. Many of us in CARET have served in priority sessions and on futuring panels for research, education, and extension. We need to maintain effective advisory boards, which include the participation of both the research and education community as well as the private citizen from rural and urban areas, with a wide variety of agricultural groups who are traditional and nontraditional users of the land grant system.

By taking a more comprehensive approach to our communities, we can address many issues and problems that face producers and consumers. Creating effective dialog between such diversity ensures that I, as a producer, will know what the public wants and how to deliver safe and nutritious products while still being sensitive to the impact on my community and my environment.

I want to express my deep appreciation for this opportunity to share grassroots thoughts with this committee about what we feel

is vital to our complex communities, and I would welcome questions and comments and respond to questions later in the dialog.

Thank you.

[The prepared statement of Mr. Guernsey appears at the conclusion of the hearing.]

Mr. DOOLEY [assuming chair]. Thank you very much, Mr. Guernsey.

Unfortunately, what we're going to have to do now, because we have another 5-minute vote and then we have two more votes, it's anticipated that we're going to recess until 1 o'clock, at which time we can reconvene, and we'll finish with Dr. Foil's comments, and then we'll enter into questions. So at this time we're adjourned until 1 o'clock.

[Recess taken.]

Mr. STENHOLM [resuming chair]. I apologize for the disruptions today. It's one of those days.

We continue with Dr. Foil.

STATEMENT OF R. RODNEY FOIL, VICE PRESIDENT, AGRICULTURE, FORESTRY, AND VETERINARY MEDICINE, MISSISSIPPI STATE UNIVERSITY, AND CHAIRMAN, COUNCIL OF ADMINISTRATIVE HEADS OF AGRICULTURE, NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Mr. FOIL. Thank you, Mr. Chairman. You don't need to apologize to us for doing the business of the people. We understand that, and we're glad to have the opportunity to be with you. Dr. Topel, the first presenter, did have to leave, but the remainder of the panel is here, and we look forward to responding to questions.

My role today is to attempt to pull together some of the more cross-cutting issues that have been covered in the testimony, and in doing so, I want to focus more on the philosophical and longer term issues and leave the details to the experts that are represented here.

As you continue your deliberations on this and related topics, I certainly hope that you will call on us and allow us the opportunity to work with you for the betterment of American agriculture.

The summary things that I'd like to stress today are limited to five characteristics of this system that I felt were worthy of including in the record. The first is obvious, I think, from the testimony you've received, and that is that the land-grant system is a very broad and a very deep system that's characterized by a lot of variability from State to State. It is a very unique system that has been one of the strengths of our Nation and one that we're quite proud of. Our activities range from the most fundamental of sciences to hands-on assistance to individual people in their lives and their livelihoods. Our roots and our major emphasis is on agriculture and family life, but our total coverage of interest covers a broad spectrum of the economy and involves linkage with a number of Departments within the Federal Government.

Now, this breadth and depth is a strength for the Nation and for our institutions, but its complexity presents challenges to those of us who seek to guide and direct those activities and those of you who seek to provide policy direction. As you continue to explore

ways in which we can improve our planning and our priority setting, as well as the implementation of our programs, I hope you'll continue to look broadly upon our capacities and continue to challenge us to serve through multiple functions across broad areas of human interest.

The second major point is something that's difficult to totally comprehend until you work in it, but the variable nature of this system brings us a strength through interdependence. That is one of the joys of the system. The broad range of subject matter, competency, and functional activities that we have, ranging from fundamental and applied research through extension education and, of course, focusing on our fundamental task of educating professionals, creates a complex web of very interdependent relationships, and in most instances this interdependency brings to us a strength and a variety that has stood this Nation well. It has provided serendipity and the opportunity for redundancy without loss of efficiency, we feel.

To draw on this strength requires an understanding of the ways in which all these parts interact, and the changing world in which we work is sometimes putting stress on the way in which these parts of the system interact. We're glad that you're looking holistically across all of these functions and all of these activities so that we can continue to build on this strength.

Another strength that we've heard stressed in virtually all parts of the testimony is that the partnership nature of the land-grant system is, again, an idea that has allowed the development of strong priorities and strong systems. It's a long-time partnership three ways with State, Federal, and local government, and increasing attention from the private sector. It has been very effective in the agricultural and family life arena, and it's being applied across a much broader range of subject matters as our capacities and as the problems that we address change.

Now, the strength coming with a number of areas of support is balanced somewhat by the need to harmonize the priority process, and we've been able to leverage the Federal money 3 to 1 with State and other money because the priorities have matched. We bring those together and try to seek a way in which we meet both short- and long-term needs and both local and national priorities. We think that we have done a good job with that, but we look forward to working with the committee on improving this synergistic relationship. As we see a broader array of educational institutions involved in these activities and as we see a broader range of elements within our institutions participating, the need to redefine the partnership becomes imperative, and it's one that we know you recognize, and we commend you for that.

My fourth point deals with the element of change in higher education. Those of us who work in the higher education community are very well aware that there has begun a transformation in the manner in which the American public perceives the higher education enterprise and the manner in which the higher education enterprise perceives and conducts its mission. As a very visible and client-oriented segment of higher education, the land-grant agricultural units have been involved in this change perhaps more deeply than some other units of higher education, and we are convinced

that this change is merely the beginning and that this will continue at a more rapid pace in the future.

During this redefinition of goals and expectations for higher education, particularly in the phase that we seem to be entering, the land-grant agricultural components are having to work very diligently with the governance factors within higher education to continue to focus our effort in the direction of client satisfaction and to defend the place that we have earned in the disciplinary array that is viewed to be the purview of higher education. The actions that the U.S. Department of Agriculture and the Federal Government take with regard to the manner in which they relate to the land-grant university has a very real impact on the manner in which we relate to the full educational component of our institutions, and we appreciate you keeping that in mind.

The last point that I'll stress, and this has already been talked about in several other testimonies, is the grassroots nature of our planning processes and the manner in which we bring together the opinions, thoughts, and creativity of our clients from the county level through the region within our State, the State level, and to the national level to identify both long-range and short-range opportunities. We feel that our priority setting process is one that has received a great deal of attention. We know that which it's capable of doing, but we also know that it can and will be improved as we devote our attention to it.

We believe strongly that the system that has been created through your investment and others is strong enough and flexible enough to meet the challenges that have been identified here today. We particularly support the stated goals of the chairman in beginning these hearings; of focusing on relevance and accountability, because we feel quite strongly that those are two components of our system that really differentiate us from many of the other elements within academia, and we're proud of what we've done. We feel that there are opportunities always for improvement, and we pledge to this committee and this Congress our commitment to that improvement.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Foil appears at the conclusion of the hearing.]

Mr. STENHOLM. Thank you, Dr. Foil.

Would any of you care to comment on the question that was raised earlier concerning the current balance and what might be a proper balance between the formula funding, competitive grants, and special grants? Do any of you have any comments? You were all there and listened to some of the previous questions and answers.

Dr. Fischer.

Mr. FISCHER. If I may, Mr. Chairman, in the testimony that I presented, I talked about the nature of funding of agricultural research and the three components being the National Research Initiative, the base programs, or, if you will, the formula funds, and I brought out the point that these formula funds do go through a peer review process, and then the special grants and what they present. In these three funding mechanisms, it is interesting to say that the Federal component of the total partnership money with

the USDA and the State ag experiment stations is about 32 percent. Of that, about half of it is formula or for the base programs.]

I further delineated that there's an opportunity to evaluate and to look at perhaps what I would classify as the continuum of research where we start from the breakthrough technology, the original idea, to where we get that application in the field, if you will. If you go on that continuum from breakthrough to application, from a personal perspective, I would break down that there are about three categories there—the breakthrough, the work that's in between, and that which is being applied in the field—and if you would look at our work, my personal opinion is about one-fourth of it sits in the breakthrough area, about one-fourth in the application area, and the remainder in the middle.

Mr. STENHOLM. Does anyone else have a comment on that?

Mr. FOIL. If you will, Mr. Chairman, just one additional thing that I think bears thought. At the Federal level, obviously, we need to seek a balance that deals with the national needs and the national nature of what we do. The balance in any given State will be quite different. I think in terms of my State of Mississippi, and our approach is much more applied and adaptive and less fundamental. The applied and adaptive nature of research is, in most cases, better served through special and formula funds and less by competitive grants, because, by nature, the competitive grants deal mostly with the fundamental kinds of science. Another State with a larger State commitment to doctoral-level training and basic research might have a different mix.

So there would be give-and-take from the system to come up with a balance that met those needs. I think Dr. Fischer made some good observations as to the general way in which these should be divided, but the individual States will be able to respond in different manners based on the nature of their priorities in the system.

Mr. STENHOLM. How much research is now funded by check-off dollars or industry dollars?

Mr. FISCHER. I can get a specific number for you. My estimate would be that it's somewhere around less than 10 percent.

Mr. STENHOLM. Any comments concerning the perception that industry-funded research is suspect because the people paying for it expect certain results?

Mr. FISCHER. That's not a new comment to me, Mr. Chairman, but I believe as we are dealing with agriculture and its changing dimensions, we will need to, if you will, build linkages with various and other entities. In my testimony earlier, I indicated it would be viable to look at other USDA agencies, look at other Departments—Environmental Protection Agency—and how we can build some linkages with them. I also believe that it is beneficial for us in the public sector to build those linkages with the private sector in order to enhance both our common objectives.

If you will, good science, quality science that goes through the peer review process for publication will not get through that process being biased, but I believe it's very powerful for us to be looking at linkages we should be building.

Mr. STENHOLM. I personally could not agree more, and one of the thoughts I want to leave with you and perhaps request a response

or two further from you on these linkages, it seems to me that when we're talking about industry-funded research with the suspect question mark from some entities out there, we do have to look at linkages. For example, I have offered the thought that in regard to food safety and environmental issues that the public health sector needs to be linked with the research community in some way, some shape or form or fashion.

Are you aware of any efforts along that line in any of your States or any of your affiliates that you represent here today in which we might have a success story or two or something that has worked along those lines, or is this still in its infancy of thoughts all over?

Mr. FISCHER. In the public health arena?

Mr. STENHOLM. Yes, the linking of the public health sector with the questions that we're talking about today.

Mr. FOIL. Mr. Chairman, I'm aware, and I know Dr. Fischer is, of the beginnings of a program in agrimedicine in South Carolina, North Carolina, and recently initiated in Mississippi.

I think it had its start in South Carolina, Jim.

Mr. FISCHER. That's correct.

Mr. FOIL. That one is a beginning, and I'll ask Dr. Fischer to mention it.

Another initiative that we're excited about is in the extension arena in a new initiative funded in a pilot fashion this past year in rural health care, a joint program between community and junior colleges, the Cooperative Extension Service, the State department of health, and the university medical center in our State. These are ideas whose time, I think, has come.

Jim, you might mention the agrimedicine.

Mr. FISCHER. Forgetting your own State is not the appropriate thing to do when you're here, but in South Carolina several years ago we looked at the situation of health, and it started out really in the pesticide area and exposure to pesticides by farmers, and we linked with the medical university in the State of South Carolina and then, through that linkage, have funded some programs where we have both a research and an outreach and extension effort to enhance the knowledge level of physicians on particular health issues that farmers would be exposed to. It has been received very well to enhance the level of knowledge of these physicians and also to build the linkage. So they are looking at us in some joint research efforts on trying to evaluate some of the impacts of health specifically that's amenable to the agricultural profession.

Mr. STENHOLM. Dr. Carpenter, how can we maintain the most efficient linkage between extension and research, along these same lines?

Mr. CARPENTER. Mr. Chairman, I believe that that is principally done at the local and State level, and I might also cite some examples for you in which, in working with the meat industry, we determined through our research program that because of some perception of a biased nature of those of us in agriculture that we needed linkage with the medical community, and so we did that—a strong medical research program in Dallas and also through the Baylor College of Medicine, looking at dietary fats and animal fats, and that's been an extremely positive and productive linkage for us.

Within extension, coordination and planning with the research components is done basically every day. We're finding many more linkages with our own Texas Department of Health, and particularly as that relates to food safety and disease and that type of thing that occurs in the valley with health-related problems.

Just recently I was in a meeting in which ES–USDA has now stationed an extension specialist at the Children's Nutrition Research Center in Houston, again, with the idea of being able to more rapidly transfer that knowledge from the research base out into the extension education programs. By the way, we will also have a person stationed there at that unit for that connection to our State program, since the ARS unit is located in the State.

This collaboration is moving very rapidly with the health profession industry, and I believe that it's timely and certainly on target because of the real health care concerns we have. Extension should be given the charge to work on the prevention side through educational programs and in that way alleviate some of the real health care problems we have in this country, and I believe that we're doing that in a very extensive way in virtually all of the States.

Mr. STENHOLM. What's been the reaction of the public health sector? Are these ideas that have been initiated by them to you or you to them? How has this contact been made and then effectuated?

Mr. CARPENTER. I would say that's been both, and also by congressional encouragement; for instance, a new national initiative that has just been initiated, the plight of young children, and being able to work through educational programs with them and their parents. That came from the Chair of your own Ag Committee saying, "What can the extension system do on this because of some of the disease problems that are also related to learning issues through time?" That comes from our needs assessment process in the local communities, through our commissioners courts. They, in fact, are paying for indigent health care. In fact, they say, "You folks can be a part of the solution to this problem that's breaking our counties and the tax issues if you'll focus your educational problems on some of these."

So I would say, Mr. Chairman, that encouragement is coming from all sectors, encouraging of linkages, and in the process that comes both from our department of health, and public health officials who are recognizing that Extension has the infrastructure and network of having professional educators in virtually every county in the country. They need the mechanism whereby they can get some of that information out to the people on a local basis, because we have that educational component.

So I would say that also is creating some of the pressures on the Extension system and some of the concerns about, "Look, you're going toward social issues." I'd rather call them societal issues that relate to the economic well-being of the State. Our economy is dependent upon us doing a better job, a more effective job on this.

Mr. GUERNSEY. Could I follow up on that?

Mr. STENHOLM. Certainly, Mr. Guernsey.

Mr. GUERNSEY. As a user and as a farmer, I'm also a county commissioner, which you weren't aware of, and I look at the Extension addressing a more holistic approach to the farm as opposed to just farm production. Because in my county—I'm a rural county—my

property tax and my inventory tax undergirds the cost of county government, and just the issues that we have heard—for instance, a low birth weight baby in our county—and I've been talking to other county commissioners to try to get this program off the ground. Extension already addresses this with training for teenage pregnancies.

A low birth weight baby will cost on the average—and I've been using $30,000, and my county hospital tells me I'm too low now. But it only takes five low birth weight babies to come to normal birth weight to pay for my total county extension budget. That county extension budget services 1,000 4–H members, about 650 to 700 homemakers, it services all of agriculture, it services community development as we utilize our ag agents, it services the horticulture needs and their urban cousins, who have lots of needs with their lawn and gardens. I'm talking about the total budget. Five low birth weight babies will pay for that, the savings on those alone.

We're looking at, in my county, the county welfare budget. When I look back over the last 4 years, it's doubling every 2 years. I was in the State legislature 3 months ago, and I said, "Folks, it may double again in 2 years and again in 2 years, but we won't pay the bill. We have to address why it's rising so fast, and we're not addressing the education side of it." I asked the welfare director, "How many families have you moved off of welfare this past year?" There was none. I said, "With the families that you're working with and cultivating, how many do you see you're going to take off the rolls next year?" There was none. So I see the family skills, management skills, health skills that Extension has to offer could effectively play a role in lessening the cost of the tax dollar in my county.

What does that have to do with agriculture? Agriculture undergirds those tax dollars, and that creates a scenario that I'm less competitive in the world market because my costs are higher. So I look at Extension addressing a broad sector of my community and neighborhood on many areas outside of just production agriculture itself. We have the skills, we have the people trained, we have the research done. Pilot projects have been done, but cannot be addressed on a broad basis because of lack of funding.

I'm excited about possibilities in the future for Extension and our communities. We are undergirding this rather heavily in our community. Extension in our county, the county government picks up 70 percent of the total cost. In our State, our counties are picking up approximately 56 percent of the total cost of extension. What you're providing here in Washington certainly leverages a healthy partnership out in my State.

Mr. STENHOLM. I want to have one more round, but I'll recognize Mr. Dooley.

Mr. DOOLEY. I just have a couple questions. I guess what's driving a lot of concern is how do we get the greatest return on the investments we're making, and I guess a lot of that, when we're leveraging Federal funds by State dollars as well as private dollars—I guess you've identified them as three different types of funding. Is there a difference between the applicability or the availability of incorporating or partnering with the private or public sec-

tor with the Federal dollars in either of those, or are they relatively the same?

Mr. FISCHER. If I understand your question correctly, Mr. Dooley, I believe your question is, is there an advantage to partnering with one versus the other?

Mr. DOOLEY. Right. Does one lend itself better than another?

Mr. FISCHER. Right now in the transition that we are moving in in ag research, we are building those linkages with all of them, and I think that is the ultimate strength and it's going to build the synergism for the research that we need to be about.

Mr. DOOLEY. If we decided that we were going to back off and reallocate some of the moneys that are currently being allocated under the earmarked portion of it into the formula or otherwise, what would be your expectation in terms of the distribution of the allocation of those funds? Would it have a significant impact nationwide?

Mr. FISCHER. Yes. The system, as was pointed out in the previous studies, is quite underfunded, and that's one of the reasons we get the very significant returns on investments that was mentioned by Dr. Offutt this morning. I think there are some opportunities for us to work with this committee in looking at some options for additional investment in this system and how that can be most effective.

Mr. DOOLEY. If we had the same amount of dollars we presently have to be allocated to research, I guess my concern would be the shift from the—let's say we wiped out the earmark grants altogether or the funding. What should we expect from this committee in terms of its impact from a regional perspective, an institution perspective, basically on ag research? What would be its impact if we went to a totally competitive allocation?

Mr. FISCHER. That's difficult for me to summarize or to come up with—it would be 100 percent speculation on my part at this time. I don't want to give you the impression that some of the work that's in the earmarks is not good quality research and that it is needed efforts. In fact, I would venture to say that perhaps part of the reason they're there is it speaks to the need for the funds in ag research. There is the option that we discussed somewhat this morning about the contract research and how it could impact some of the pressing needs that are in our system that we cannot anticipate when they're coming in front of us and they cannot go through a normal budgeting legislative process.

I would be willing to follow up more on this with a little additional time to give you some more perspective from the background.

Mr. DOOLEY. Dr. Mortensen, in your testimony, you commented that we've got to maintain our commitment to one of the missions of our institutions as far as on the education component. Is there something about the way that we're allocating our dollars for ag research now that is detracting from the ability to meet the educational mission of our institutions?

Mr. MORTENSEN. No, I did not intend to imply that. It's just that the higher education budget is very modest when you look at the total USDA budget. For instance, this fiscal year it's less than $20 million.

Mr. FOIL. If I may, Mr. Chairman, there's one way in which the funding mechanism impacts the educational component, and that is that the formula funds are perceived in the academic arena as being funds that can be used for long-term commitments to faculty salaries, to faculty members, and that directly impacts particularly graduate education. Competitive grants and special grants are rightly considered as short-term funds that should not be invested in a long-term commitment, and as we've seen this shift that was outlined in the original chart, we have, in a number of our institutions, had difficulty maintaining the balance between the educational mission and the research mission because of the mechanism of funding that was not as amenable to that balance.

Mr. DOOLEY. Well, then, as my final question, the trends that were identified on the chart which showed the formula funding declining, which obviously, I guess—and I understand the impact that the decline can have on the education and certainly the number of staff people or educators and professors you can bring on. Is there a consensus among you that that trend ought to be reversed and that the formula funding ought to be increasing and that we get back more to the allocation that we saw in the 1985 levels?

Mr. FISCHER. If I may, the chart that was up earlier was on a percentage basis, so the actual dollars did not decrease.

Mr. DOOLEY. Right. No, I'm talking about relatively. Have we gone in the right direction or the wrong direction?

Mr. FISCHER. The nature of the formula funds has been that they have not kept pace with the inflationary efforts. There has to be the balance that we talked about earlier. We believe that the National Research Initiative from a competitive basis is good, it's solid, has this administration's support where we believe that the formula funds—as I said in my statement, we should at least maintain an inflationary edge on that funding in order to enhance those types of programs, and we believe that there's a need for special research grants to address pertinent issues that need to be addressed that come up, as you know, as I know, suddenly—the corn blight—some of these issues that come popping up at us that we cannot anticipate and they don't fit in the legislative process.

Mr. DOOLEY. You folks are on the frontlines here dealing with these different problems. Are we better off with the allocations as they are relative in 1993, or would we be better off and getting more for our investment of research dollars as we saw them in 1985 where we did see a greater relative percentage in the formula funding versus the earmarked and the competitive, or does it make any difference whatsoever?

Mr. FISCHER. The total funds have gone up. Formula funds stayed the same. Total funds have gone up. So comparing now to then is the challenge we have that in 1985 we had about the same dollars as in 1992. However, they were not adjusted for inflation to that in the formula.

Mr. DOOLEY. So you're basically not prepared to say that we'd be better off having the same percentage of the total funding for research allocated to the formula funds as we did in 1985?

Mr. FISCHER. What I would say is that the National Academy of Sciences study and what was in the 1990 farm bill with the Na-

tional Research Initiative increased the competitive component, and that's what you're witnessing there.

Dr. Foil.

Mr. FOIL. I think all this hasn't been really debated. I think you'd find consensus in the community that the current pattern is a better pattern than existed when we were so heavily dependent on formula funds. You could argue a little bit about the relative growth of the targeted funds versus some of the others, but in general I think you would get a consensus that we have a stronger system by virtue of having the competitive grant option as a measurable component.

As we progress from where we are now to where we want to be in the future, I think we need to do some work on that balance. This was a conscious decision to increase the competitive component, and I personally think it's time to reexamine that balance in light of changes that have taken place in expectations and in the manner in which Federal priorities are addressed, and that's what you all are meeting about.

Mr. DOOLEY. Thank you.

Mr. STENHOLM. Dr. Fischer, if you need to leave, you may be excused.

Mr. FISCHER. If there's anything quick, I'd be glad to respond to it, Mr. Chairman.

Mr. STENHOLM. Well, whenever you need to leave—you know your schedule—feel free to do so. We're almost down to the short rows now.

Following up with Mr. Dooley's question, I believe you were speaking to the competitive grants in saying that you believe the system is better off now with having increased the competitive grants perhaps at the cost of the formula funding, if that's what I heard you say. But can you also comment as to the increase in earmark grants? Are you saying that they, too, with the increase in the earmark grants—in your estimation and judgment, we're better off today with the increase in earmark grants than we would be if, say, that line had been on competitive grants going up or on formula?

Mr. FOIL. Since that was my statement, I'll respond, Mr. Chairman. First, the increase in competitive grants was not directly at the expense of formula unless one assumes that those funds would have gone to the formula had they not gone to competitive, and I'm not sure that that would be a valid assumption. But the targeted funds are such a variable group of projects that it's very difficult for me to generalize about them. If you accept Dr. Savage's $146 million figure, which I think is a little high, but if you accepted that, I would personally say that about one-third of that really was put into projects that almost are beyond the purview of this committee or it was a nice place to get something done that needed doing. A lot of the facilities were.

Mr. STENHOLM. By whose judgment?

Mr. FOIL. Well, my judgment was that there was a provision in the Federal appropriations process that allows the Federal Government to address an issue through the agricultural budget perhaps more easily done than through some other budgets, and there have

been facilities built for things that really don't have much relationship to agriculture, if you get right down to it.

Mr. STENHOLM. Well, that's what I'm trying to get at, to get a general consensus on the part of the five of you as to whether that is a desirable process for us to continue or if that is a process that perhaps we should take a little in-depth look at and see if it can be improved.

Mr. FOIL. I think you'd find support from the community for an in-depth look. I believe in Mr. Guernsey's testimony he referred to a position of the land-grant association on facilities and the manner in which they are funded. We feel very strongly that is something that can be improved and improved significantly.

With regard to the special grants for the conduct of research, I think Dr. Fischer's proposal to look closely at them and use them as contracts to accomplish targeted needs, that's the strength of our system and that's good by most people's standards. You can argue around that $150 million, but probably $75 million of it was as good a use as you could make of it. Maybe more. Maybe $100 million. Some of the others you could argue about compared to what. So we need to get a good system.

The Congress needs a chance to express their priorities just as the executive branch has, and in my State we're pretty comfortable with a lot of those priorities because we're pretty close to the same people that send you all to come represent them. But there are some very real needs to look at the mechanisms that make it easier perhaps to create a State resource with Federal dollars through the ag appropriations bill. I've got some good examples in my State that happened that way just because it was a way in which a need could be addressed that was not available through another branch of the Government. And the need was real. It's not a question of the priority of the need. It's just the mechanism.

Mr. FISCHER. If I may, Mr. Chairman, just further comment, judging from our interaction with you, I hope you take a lot of consolation in the fact that we're wrestling with some of these same issues that you are, and we're super appreciative that you're willing to work with us on it, and anything that we can do to facilitate this, we'd be more than happy. But it's time for us to ask some of these questions.

Mr. STENHOLM. I appreciate that statement.

Any final comments?

Mr. CARPENTER. Mr. Chairman, the Extension budget was able to go along for quite a number of years of not having many of the special earmark projects. There has been some increase in this over the last 4 or 5 years. However, there are some special project fundings on national initiatives that, I would submit to you, have been extremely successful. For instance, the water quality initiative that's a targeted project, educational program, rather than formula. We believe that has been supported on behalf of the extension system.

There have been criticisms that the formula funds were completely flexible. That's not the case. However, some of the targeted programs, like on water quality, on food safety and quality, on integrated pest management, are really targeted to national needs, and we fully support those. There are some of those that have been ear-

marked that we're not as proud of, but we recognize who does the appropriations, too.

Mr. STENHOLM. I have several additional questions, but I will submit those to each of you in writing for inclusion into the record.

We again apologize for the disruptions of the hearing today. We do appreciate each of you being here and particularly the latter statement that I know you all share, and you look forward to working with this committee as we do wrestle with some very difficult questions that perhaps all of us would just as soon not have to face up to. But I think we're probably going to have to, and we certainly will appreciate your help and support and look forward to working with you.

Thank you all very much.

If there's nothing further to come before this hearing, we shall stand adjourned.

[Whereupon, at 2:45 p.m., the subcommittee adjourned, to reconvene, subject to the call of the Chair.]

[Material submitted for inclusion in the record follows:]

STATEMENT OF JAMES D. SAVAGE
TO THE COMMITTEE ON AGRICULTURE,
SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION,
MARCH 25, 1993

Mr. Chairman, my name is James D. Savage, and I am Associate Chair and Assistant Professor in the Department of Government and Foreign Affairs at the University of Virginia. Thank you for inviting me to share with your subcommittee my thoughts on the issue of employing direct appropriations, or earmarks, for funding university-conducted agricultural research.

In 1992 I served as a consultant for the Congressional Research Service, for whom I analyzed the trends in earmarks for universities and colleges during the fiscal years 1980 through 1992. First let me say that an earmark, by Office of Technology Assessment definition, refers to "a project, facility, instrument, or other academic or research-related expense that is directly funded by Congress, which has not been subjected to peer review and will not be competitively awarded." Using this definition as a guide, my data indicate that during FY 1980-1992, approximately $2.5 billion were earmarked for some 234 universities and colleges. The trend in earmarking during these years clearly is one of rapid growth, as shown in the Table 1 (page 8). In FY 1991, for example, $470 million in research funds were earmarked, and that amount grew in FY 1992 to $708 million.

Of this total figure of $2.5 billion , approximately $625 million,

or a quarter of all earmarks, have their origins in agriculture appropriations. Here again, the trend is one of sustained growth, as shown in Table 2 (page 9). In FY 1990 and FY 1991, the level of earmarking appeared to plateau at about $100 million, and then jumped by 34 percent to $146 million in FY 1992. Let me note that these figures for agricultural earmarks, particularly for the early years of this study, are conservative. Earmarks are often difficult to identify, and I estimate that the total figure to be $10 million to $25 million higher, and thus range in the area of $650 million.

There are several negative consequences of earmarking agricultural research. One consequence is the harm it does to the legitimacy of academic agricultural research in general. Two presidents, Mr. Reagan and Mr. Bush, singled out university-conducted agricultural earmarks as examples of waste and pork barrel politics, and a cause of the Federal deficit, in their State of the Union Addresses. These examples, which are often comically highlighted by the media, can only cause the public to question the effectiveness of the Federal government's research efforts in this field, and to increase their skepticism about Congress and how it operates.

Earmarking's negative influence on the legitimacy and status of agricultural research also extends to the universities that conduct this research. Every member of this Committee and Subcommittee should be aware that there are universities that would never

consider attempting to earmark the National Institutes of Health (NIH) or the National Science Foundation (NSF), but who willingly hire lobbyists and seek agricultural earmarks. In 1989 I produced a list of academic earmarks that included agricultural projects. The president of the Association of American Universities (AAU) criticized the list by saying that agricultural research had a distinctive "culture," where the standards of NIH and NSF do not apply. Thus, one Ivy League university, noted for its decision to refuse a $5 million earmark for a supercomputer, accepts and has increased is efforts to secure agricultural earmarks. Only recently has the issue of whether agriculture projects should be counted as earmarks been raised within AAU. Chancellor Joe Wyatt of Vanderbilt University, for example, has asked his fellow AAU presidents, "Is AAU's stated position in opposition to earmarks undercut by tolerance for Agriculture earmarks?" In addition, former AAU President Robert Rosenzweig has acknowledged that AAU may have been mistaken in limiting its condemnation of direct appropriations in the agriculture appropriations bill. Unfortunately, this tolerance for agricultural earmarks that Chancellor Wyatt addressed continues to be the dominant opinion within the university research community. I believe this view of agricultural research within academia, where pork barrel is the accepted name of the game, helps to reduce agricultural research in general to second-class status within the academy.

Moreover, the academy's green light for earmarking the agricultural

appropriations bill has resulted in universities and colleges seeking projects there that have little to do with agricultural research. These projects include technology centers, trade centers, and biology centers. When academic institutions fail to obtain earmarks in those appropriations subcommittees where academic earmarks are generally shunned, such as in the House Labor-HHS-Education Appropriations Subcommittee, they turn to the other subcommittees to fund their projects. The effect of this, of course, is to reduce the funds available under the appropriations subcommittee allocation for true agricultural research.

The Subcommittee should also be aware that some universities attempt to avoid the charge that they are earmarking by subcontracting their project in a manner that involves a modified form of peer review. This practice is not uncommon in the Special Projects awards funded from the agriculture appropriations bill. For example, one university will obtain an earmark and, acting as the principal investigator, share the award with several other universities organized as a consortium. This is the case with the mosquito research funded through Special Projects; in another example, the Midwest Plant Biotechnology Consortium consists of an estimated eighteen universities. The consortium establishes a peer review panel, which sometimes consists of faculty only from those particular universities, to allocate the funds within the group. Thus, although the initial award was earmarked, the subcontracting faculty and institutions claim that their project underwent peer

review, but peer review comprised of peer review panels they themselves established.

I raise these points because I believe the Subcommittee should be aware of how universities and colleges are adapting to what is the willingness of the Congress to earmark academic research. To its credit, the academic community in general has sought an expansion of competitive USDA research programs, but has often confronted hostility from the agriculture appropriations subcommittees. Proposals for expanding competitive research programs, for example, were met with counter proposals to restrict indirect costs rates for competitive grants. In the face of this resistance, universities and colleges continue to adapt to the resource allocation system Congress has allowed to develop.

There are other, more familiar, negative consequences to earmarking. The most obvious is that without peer or merit review, there is little or no systematic evaluation and accountability for determining whether these earmarked projects represent the best research for the dollar. After talking with appropriations subcommittee staff, it is my understanding that the USDA has rarely, if ever, evaluated an earmarked project and found it to be wanting. It is not clear to me if this is the situation because the USDA is reluctant to offend a Member of Congress who sponsored the project and the university that conducted the research, or if all of these projects, in fact, produce acceptable research. Even

if all these projects did produce "acceptable" research, however, this does not mean that the best research was funded to meet specific policy driven needs. I suggest that the best research is more likely funded through a competitive merit review system than through earmarking.

In any case, if $650 million have been allocated through earmarking for agricultural research, what have these projects produced for the taxpayer? Those universities that have received the bulk of these earmarked dollars should be called upon to report on just how many patents, new discoveries, and improvements in American agriculture have resulted from these funds. I am delighted that Chairman George Brown, in the Science and Technology Committee, has made such requests of a number of academic institutions.

Earmarking also greatly diffuses the Federal government's ability to set priorities and address national problems. Often enough, these earmarked projects reflect the particular interests of university researchers who work through their institutions and the appropriations committees to secure fund for their specialized research concerns. How these interests fit into a broad strategy for improving agriculture is not always apparent. Meanwhile, those USAD competitive grants programs, which are more likely to reflect the general policy goals approved through the normal legislative process, must compete with these earmarked projects for scarce dollars within the allocation for the agriculture appropriations

bill.

In summary, Mr. Chairman, the practice of earmarking academically conducted agricultural research is increasing. Given the obvious incentives, universities and colleges will continue to seek earmarked funds, and do so in a more sophisticated manner. These funds, however, lack the accountability, emphasis on merit, and reference to meeting national priorities, that are more typical of peer reviewed research.

8.

TABLE 1

APPARENT FY 1980-92 ACADEMIC EARMARKS,
BY FISCAL YEAR

Year	$ Amount	Number
1980	$10,740,000	
1981	0	0
1982	9,370,000	9
1983	77,400,000	13
1984	39,320,000	6
1985	104,085,000	39
1986	110,885,000	38
1987	163,305,000	48
1988	232,392,000	72
1989	299,026,200	208
1990	247,976,333	252
1991	470,279,499	279
1992	707,989,000	499
Total	$2,472,769,031	1,470

9.

TABLE 2

APPARENT AGRICULTURE ACADEMIC EARMARKS,

BY FISCAL YEAR

Year	$ Amount	Number
1980	$4,240,000	5
1981	0	0
1982	7,318,999	7
1983	11,550,000	3
1984	1,000,000	1
1985	39,015,000	16
1986	15,516,000	16
1987	57,205,000	27
1988	49,302,000	28
1989	82,589,200	150
1990	100,028,333	182
1991	109,328,499	173
1992	146,368,000	271
Total	$623,461,031	879

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WRITER'S DIRECT LINE

April 19, 1993

Mr. Mike Westendorf
Committee on Agriculture
Subcommittee on Department Operations
and Nutrition
1301 Longworth House Office Bldg.
Washington, D.C. 20515

Dear Mike:

Here are my responses to the Subcommittee's written questions:

1. Certainly not all special grants are bad, please describe for the subcommittee what the benefits of special grants?

Unfortunately, I do not agree with the premise of this question. Whether certain special project grants produce adequate or even good research is not the point. Taken in their entirety, without proper merit review and evaluation, these grants very likely will produce less effective research than competitive grants. Moreover, because of the Appropriations Subcommittee's 602b allocation restrictions, every dollar spent on special grants reduces funding for competitive grants and other agriculture programs. As far as the claim goes that some projects are so special or of such timeliness that they merit earmarking, I reply that both authorizations and appropriations committees may make programmatic changes through the regular legislative process. At that point, researchers and universities may submit proposals to the Department of Agriculture for funding. If they are good enough, these proposals will be funded. As for timeliness, I do not believe that there has been a single special project grant that was a life-and-death matter, that did not deserve proper merit review and taxpayer accountability. Finally, although I applaud the efforts of the authorizations committees to control the earmarking of the appropriations committee, I do not regard earmarking by the authorizations committee to be somehow superior. Two wrongs do not make a right.

2. As you mention in your testimony, some institutions abstain from NIH or NSF earmarks yet willingly lobby for agricultural earmarks. Why do you think there is this different interpretation about what constitutes an earmark?

Agricultural earmarking was common practice a number of years before the Association of American Universities objected to the

earmarking of the energy appropriations bill in 1983. What got AAU upset was that energy represented a major funding source for universities, and, more important, the fear was that earmarking would spread to NSF and HHS/NIH. The vast majority of federal funding for research universities comes from NIH and NSF, and university presidents are very sensitive about the earmarking of these programs. Agriculture funding, however, represents very small change for big, elite research universities, and so these institutions paid little attention to agriculture. Moreover, most university presidents have little knowledge about agriculture, particularly in comparison to the regular science, social science, and humanities curriculum. I have interviewed any number of major university presidents who draw a blank when it comes to agriculture. This lack of understanding reflects the second class status of agriculture within academia. At the same time, those universities that have benefitted from agriculture earmarking have been reluctant to rock their own boats. It was easier for these institutions to criticize the expansion of earmarking to other federal agencies than it was to take funds from their own researchers who were receiving earmarked agriculture funds. So, as in the example of my oral testimony, Cornell refused new earmarks from defense appropriations, but continued to accept them from agriculture appropriations. Thus, the relative unimportance of agriculture funding versus NSF and NIH, the lack of understanding among university leaders about agriculture, and the defense of agriculture earmarking by beneficiaries, has resulted in the argument that agriculture earmarking is somehow unique, and represents a special "culture" of federal research funding.

3. Why do you feel there has been the increase in earmarks in the last 12 years?

The increase has taken place for the following reasons: 1) Universities have learned from each other how to earmark. This learning process has taken time, but that knowledge is now diffuse. Moreover, there are almost no penalties within academia for earmarking, but there often are rewards for university presidents who bring additional financial resources to their institutions. 2) Lobbying organizations have been very active in recruiting clients, and are increasingly successful in their recruitment, as they can point to successful earmarks as examples of their abilities. 3) Members of Congress have learned from their colleagues that academic earmarks are another way of providing constituent services. 4) The facility needs of universities have become increasingly acute, and these institutions are looking to any funding opportunity. The federal government's willingness to earmark provides an obvious source. 5) Other funding sources have become more difficult to tap, especially state funding for public universities.

4. Which states have fared the best at obtaining agriculture earmarks and how well have they fared? Why?

For FY 1992, the following states can be approximately ranked as

the top ten recipients of agriculture earmarks; the dollar figures represent estimated amounts: 1) Michigan, $16,153,600; 2) North Dakota, $10,082,000; 3) Wisconsin, $8,169,000; 4) Hawaii, $8,041,000; 5) Arkansas, $8,035,500; 6) California, $7,207,000; 7) Texas, $7,207,000; 8) Nebraska, $5,351,000; 9) Iowa, $5,108,000; 10) Mississippi; 4,672,000. These states have fared well because they are strongly represented on agriculture appropriations, and to a lesser extent, on agriculture authorizations committees.

Attached to this written response is what would constitute Table 3 of my testimony, "Apparent FY 1992 Academic Agricultural Earmarks, Ranked by Institutions Receiving $1 Million or More." This table indicates, among other things, that ten schools received 50 percent of all the earmarked dollars. Earmarking favors the few, and as a process it does not produce equal outcomes to counterbalance the supposed unequal distribution of peer/merit-review.

I would again like to thank Mr. Stenholm and you for the opportunity to testify before the Subcommittee. If I can be of further service, please contact me.

Sincerely,

James D. Savage
Associate Chair

Attachment

TABLE 3

APPARENT FY 1992 ACADEMIC AGRICULTURAL EARMARKS,

RANKED BY INSTITUTIONS RECEIVING $1 MILLION OR MORE

Earmark Rank		Earmarked Funds	Percent of Funds (Cumulative)
1.	Michigan St U	$ 16,153,600	
2.	U Wisconsin	8,169,000	
3.	U Hawaii	8,041,000	
4.	U Arkansas	8,035,500	
5.	Rutgers U	6,304,000	
6.	U CA Riverside	5,387,000	
7.	U Nebraska	5,351,000	
8.	U North Dakota	5,281,000	
9.	Iowa St U	5,108,000	
10.	Texas A&M	4,999,000	50%
11.	North Dakota St U	4,801,000	
12.	Mississippi St U	4,672,000	
13.	Purdue U	4,499,000	
14.	Washington St U	4,258,700	
15.	Oregon St U	3,678,700	
16.	Kansas St U	2,746,000	
17.	St Joseph's U (PA)	2,710,000	
18.	U Illinois	2,309,000	
19.	Louisiana St U	2,065,000	
20.	Cornell U	1,948,000	73%
21.	U CA Davis	1,820,000	
22.	Pennsylvania St U	1,583,000	
23.	South Dakota St U	1,515,000	
24.	U Georgia	1,501,000	
25.	U Maryland	1,437,000	
26.	U Missouri	1,430,500	
27.	New Mexico St U	1,430,000	
28.	U Idaho	1,354,700	
29.	U Montana	1,353,700	
30.	Virginia Poly St U	1,346,000	83%
31.	Texas Tech U	1,300,000	
32.	Oklahoma St U	1,252,000	
33.	U Maine	1,098,000	
34.	U Tennessee	1,062,000	86%
Other Institutions		20,438,600	100%
Total		$ 146,368,000	

Testimony before the Subcommittee on Department Operations and Nutrition of the House Agriculture Committee

Presented by Dr. James A. Kloek, Chairman
National Agricultural Research and Extension Users Advisory Board

March 25, 1993

INTRODUCTION

Mr. Chairman and members of the Subcommittee thank you very much for inviting me to testify regarding the state of our national agricultural research facilities. I am pleased to be here today as a representative of the National Agricultural Research and Extension Users Advisory Board (UAB) and as an advocate for change in science and education.

The issue of facilities allocation and upkeep is an extremely important topic in science and education. However, it is a topic often bypassed because of the uncomfortable questions it raises. Mr. Chairman, the UAB is here today to say it is time to face those tough questions. In this time of budget reduction, we must ask and answer: How do we reform the system of federally-funded agricultural research facilities in order to:

(1) meet scientific priorities;
(2) close outdated and run-down centers; and
(3) establish an effective planning process for future needs?

Mr. Chairman, I will give you a thumbnail sketch of the UAB and its concern with research facilities. The UAB was established by the Congress in 1977 to provide "user" recommendations to policymakers regarding agricultural research, extension, and higher education. UAB members are private citizens from a variety of walks of life. Our job is to provide feedback to the USDA and the Congress--to tell them what works and what doesn't from a customer's point of view. Our activities include publication of an annual report for the Congress and the Secretary of Agriculture in which we review the budget and make recommendations about how best to spend taxpayer dollars.

The issue of research facilities has concerned the UAB for more than a decade. UAB members have traveled throughout the Nation to evaluate science and education programs and, in turn, have visited many Agricultural Research Service and university

agricultural research facilities. Starting in 1981, we have submitted recommendations in written reports to the Secretary and the Congress on facilities, including a 1990 position paper on this issue to the U.S. Senate Committee on Agriculture, Nutrition, and Forestry.[1]

The UAB believes that to maintain the finest agricultural research facility program in the world, this Nation must build accountability into that program. First, the Nation must develop a cohesive overall strategy for agricultural research. Then we must determine if existing or proposed agricultural research facilities can fulfill the strategy's long term goals and objectives.

Before I go into greater detail, Mr. Chairman, allow me to cut to our bottom line: **It is the UAB's opinion that Congress should delay any authorization or appropriation of funds for additional agricultural research facilities until we have in place:**

(1) a strategic national facilities plan; and
(2) mechanisms to evaluate all current and proposed facilities.

BUDGET REALITIES

The backdrop to our discussion today is the national budget crisis. We listened very carefully when you spoke before the UAB last month, Mr. Chairman. We appreciated your candor about the challenges facing the research and extension system. We want the Subcommittee to know that the UAB agrees: Control and accountability in the budget is not only top on the congressional agenda but top on our agenda as well.

Across government, the research community is being asked to tighten its belt. Congressman George Brown, Vice Chairman of this Subcommittee, recently noted in Science that the United States will spend $12 billion on civilian basic research alone this fiscal year.[2] The message in his article is that the near future holds little to no growth in research funding.

The science and education agencies of the U. S. Department of Agriculture (USDA) consume approximately $1.6 billion

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[1] Report on National Peer Review of Federal and State Agricultural Research Facilities, 1989

[2] Honorable George E. Brown, Jr., Science, Vol. 258, Oct 9, 1992, Rational Science, Irrational Reality: A Congressional Perspective on Basic Research and Society.

annually. This is a small sum - particularly when it is compared with the funding of other Federal science agencies, and when we consider the magnitude of the challenges facing the agricultural sector. However, the current budget climate makes a budget increase unlikely. In fact, the agricultural research establishment now finds itself in the position of defending its budget and organizational structure from those who advocate overall reduction and reform of USDA.

The reality is that the agricultural research and extension community is being asked these days to do more with less.

A clear and troubling trend has emerged over the last several years: More and more funds are diverted from actual research projects to facilities maintenance and construction. Such diversions undermine the ability of scientists to solve pressing problems such as groundwater protection, crop protection, and food safety.

Moreover, the scramble for limited dollars has resulted in an exponential increase in congressional earmarking of research funds. The UAB believes that earmarking money for facilities has accelerated the overall diversion of Federal funds. We have articulated this position in several reports including our most recent appraisal of the FY 1993 budget.[3] The money spent building, staffing, and maintaining earmarked facilities has seriously eroded base program funding, thereby prompting even more earmarking as the agricultural industry seeks special grants to offset cuts in basic funding. This cycle guts the integrity of our science and education programs.

Obviously scientists require modern facilities, and it the federal government has a responsibility to provide them. However, the funds now spent on facilities are invested inefficiently. Many facilities have weak justification for existence and would not pass the scrutiny of peer review.

I must caution, however, that one popular budget solution - across-the-board spending cuts - will not work here. An across-the-board cut would have the same effect as a farmer cutting off the tops of all the plants in a field to rid that field of weeds. The smart farmer employs a different strategy. He scrutinizes his field, helps the valuable plants to grow, and removes weeds at their roots.

Mr. Chairman, we need to adopt the "smart farmer" approach to facility management. Congress and USDA need to scrutinize the agricultural science and education system and develop a strategic

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[3] "Appraisal of the FY 1993 Budget for Food and Agricultural Sciences, UAB (February, 1992).

national plan. If we have a clear and coordinated roadmap for this system, not only would we be able to develop a national plan for the locating research facilities, we will also be able to identify and close any facility that is off-course.

THE STATE OF OUR FACILITIES

How many facilities are there?

Most of the federally-owned and operated agricultural research facilities are under the Agricultural Research Service (ARS), the in-house research arm of USDA.[4] There were 139 ARS research sites in 1981 when the UAB first reported its concern about the distribution and number of research facilities. Now there are 126 ARS laboratory sites. Approximately half of the 121 domestic sites are located in the same town or city as a major agricultural university. Many of the sites consist of several buildings and trailers, although the sites are referred to as "one facility."

The vast majority of new facilities built with Federal funds are actually State university facilities. For example, the federal government provides money to build a facility at a land grant university, which is then handed over to the state to maintain and operate as part of the state's agricultural experiment station. Since fiscal year 1978 the federal government has contributed close to $500 million for such facilities. If the facilities in the "pipeline" are completed, it is estimated that it will cost the federal government a minimum of $1 billion.

How old are the facilities?

Many of the ARS facilities were built before or immediately after World War II. For example, the four major regional research centers, which are playing an increasingly important role with renewed emphasis on new uses research, were authorized in 1938 and constructed soon after. Many of these older facilities are scheduled for major renovations to meet current safety and health requirements. Many older facilities are not suitable to conduct modern biotechnology and other advanced research.

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[4] The 126 ARS laboratory sites include 121 domestic and five foreign locations. Also, 15 of the 121 domestic sites are not facilities, but rather consist of ARS scientists stationed at universities (ARS still contributes to facilities repair, maintenance, and renovation costs at these university sites).

What do these facilities do?

ARS is the "in-house" agricultural research agency of USDA (although much of ARS's research is conducted in direct cooperation with state agricultural experiment stations). ARS has 8,300 full-time equivalent staff, of which 506 serve in the Washington headquarters. The ARS fiscal year 1993 budget totals $746,262,000 and the agency researches a broad range of topics critical to the agricultural sector.

PROBLEMS WITH THE CURRENT SYSTEM

The UAB has seen facilities that are outdated, understaffed, and/or in serious disrepair. Many facilities remain in operation despite evidence that the they should be closed or consolidated with other facilities. Moreover, new facilities are being built with no planning and little regard for national scientific priorities.

Mr. Chairman, allow me to highlight seven facility problems identified by the UAB that may raise eyebrows around the Committee table. But before I do so, I want to stress that these problems alone may not add up to a mandate for closing a facility. For example, our premier national laboratory in Beltsville, Maryland suffers many of the problems I will discuss. Yet the UAB feels strongly that Beltsville should remain in operation and additional funds should be designated to improve this facility. In other words Mr. Chairman, I present these seven problems as red flags, waved to summon the Committee to further investigation and to indicate the need for overall strategic planning.

Problem One: Facilities are in severe disrepair.

In 1990 a USDA panel reported on the physical decay of the ARS Plum Island Animal Research Center in New York. In November 1992 the New York Times published a front page story about this facility entitled "Unit for Animal-Disease Study Trims Safeguards". It was pointed out in the article that staff cutbacks made by the private management company had undermined the traditional safety precautions at the island and that the center's plant and equipment have deteriorated to the point that repairs are expected to cost $60 million.

In fiscal year 1990, USDA estimated the necessary repair, maintenance, and renovation costs for its domestic ARS sites. Almost every site--106 out of 124--were scheduled for some work. In total, ARS's 1990 needs for repair totaled $348,434,000. That amount is staggering compared to

ARS's overall 1990 research budget of $456,434,000.[5]

In other words, for every dollar spent on research, ARS will have to spend an additional 76 cents to repair these facilities in order to meet health and safety codes. If the trend continues, we will have little money left for research after attending to facility needs. Putting this in an agricultural context, we are eating our seed corn.

Problem Two: Buildings are staffed at less than full capacity.

While we know some research is being conducted in metal barns and dilapidated offices, we also know that other ARS buildings are not being employed at their full capacity. The agency has 3,000 buildings with approximately 12 million square feet of space; and 8,300 full-time-equivalent employees. This indicates there is close to 1,500 square feet of facility space per employee. If you only calculate the 5,250 scientists and technicians and the 5,639,811 square feet for laboratories and offices, there is 1,074 square feet per employee. While some of this space includes sheds and auditoriums, there is little doubt in our minds that there should be no need for increased capacity and that some space is under-occupied.

Problem Three: The support staff-to-scientist ratio is too high.

In its July 1982 report, the UAB recommended a reorganization of ARS to reduce excessive layers of supervision and administration. The generally accepted ratio of support staff to scientists is 2:1. We believe that in many cases support staff for ARS scientists exceeds this ratio.

The high ratio of support staff per scientist can be caused, in part, by problem two - buildings not staffed at full scientific capacity. For example, each facility must have a certain number of employees for maintenance, administration, and clerical work. If the facility is operating below its full scientific capacity, the result is a high ratio of staff per scientist. On the other hand, the Plum Island story illustrates that scaling back support staff is often the first response to a budget reduction. The result can be bad management and safety risks. The lesson is you can't win unless you set priorities.

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[5] Information based on April 14, 1989, data sent to House and Senate Agriculture Committee leadership by Secretary of Agriculture, as requested.

Problem Four: The facilities are remote from scientific centers.

In order to effectively carry out research, scientists need to interact with each other. In its February 1983 report and again in later reports, the UAB said that scarce program funds must be judiciously applied to high priority programs rather than thinly spread among a multitude of projects. Many ARS facilities are too small to provide a "critical mass" of scientists, and are located too far away from other research centers to allow for regular collaboration.

Problem Five: There is no national agricultural science facility plan.

Because there is no overall priority setting, there is no national planning for new facilities. If biotechnology is the "hot" issue in a given year, then all five facilities built that year are biotech facilities despite pressing needs in other disciplines. In addition, we are building new facilities at such an alarming rate that we do not have sufficient staff to operate many of the labs once they are built.

Problem Six: The system of allocation is politicized.

The July 1982 report expressed the Board's concern that many of the ARS facilities were established in an era of Federal expansion. Moreover, their locations appeared to have been determined by politics rather than agricultural needs.

The system for allocating research funds for research facilities has become even more politicized since that report. The pressure to build new federal research labs and state facilities comes not only from Members of Congress, but also from the universities that benefit from having new labs built on their campuses. Universities are hiring high-priced lobbyists to win congressional appropriations. Universities tell their Congressmen that without modern facilities, they are frozen out of the competition for research grants.

In absence of a strategic national plan for facilities, there is little reason to resist earmarking. It is the only game in town.

Problem Seven: There is no end in sight.

Unfortunately the facility problem is not going away. A 1988 National Science Foundation report found that 38 percent of state agricultural facility space was inadequate.

The report also found that 46 percent of State university agricultural space is in need of repair.[6] The pressure to build and renovate facilities is increasing.

PREVIOUS REPORTS/INVESTIGATIONS

Although the UAB first pointed out the facilities problem more than a decade ago and has produced numerous reports on the topic, our analysis has been verified by subsequent reviews.

Independent reviews by the Office of Technology Assessment, the National Academy of Sciences, the National Science Foundation, the National Association of State Universities and Land Grant Colleges, and the Senate Agriculture Committee all report that many of the Nation's research facilities are underused, run-down, and duplicative of other facilities.

Ten years ago, a General Accounting Office (GAO) investigation of ARS facilities concluded that many facilities were underused. Some facilities were staffed at only 17 percent of capacity because, GAO charged, the system had too many facilities in light of ARS's declining personnel. GAO recommended that USDA consolidate research activities at fewer locations.[7]

PREVIOUS REFORM EFFORTS LAUNCHED WITH NO SUCCESS

Users Advisory Board Recommendations

As early as 1982, the UAB began calling attention to the state of disrepair of ARS research facilities. In its February 1985 report the Board pointed out that awarding federal funds for research facilities, without peer review or adding ongoing operating funds, competed with funding for programs. The result, we said, is interference with the setting of long-range objectives and strategies.

In 1988 the UAB further urged that no new construction be undertaken on any ARS location until the existing Beltsville facilities had been returned to first-class status. The next year the Board recommended that funds needed to repair and update Beltsville and the four regional laboratories be made available

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[6] National Science Foundation, NSF-PRA Report 87-3, Infrastructure, the Capital Requirements for Research, May 1987

[7] Government Accounting Office, GAO/RCED/83-20, Federal Agricultural Research Facilities Are Underused, Jan. 14, 1983

from reallocations realized by closing or consolidating obsolete, unneeded, or inefficient ARS research facilities.

The UAB also recommended that if a university or a state believes such a facility is vital to agriculture in its area of the country, ARS should transfer, lease, or loan that facility to a local research body. In this way, ARS can more properly concentrate on research activities and initiatives that have national significance.

We urged in the 1990 February report that repair and maintenance costs for all facilities be assessed realistically, and funding levels be adjusted to ensure, at the very least, that these major facilities do not deteriorate any further. We said we did not support new facilities unless a comprehensive review of present facility options shows that a cost-saving consolidation would result. We also recommended that ARS and Congress not continue to add new facilities if present facilities are not fully utilized.

The February 1991 report asked ARS to develop standards of operation for its facilities, and to close or consolidate those facilities that fail to meet such standards. These standards would be spelled out in the ARS 6-year strategic plans, but preferably with a 10-to 15 year outlook. These plans should also include the amount of funding necessary to keep facilities of long-term importance in good repair.

In 1988 the UAB recommended closing 20 Agricultural Research Service research facilities in FY 1989 and another 20 in FY 1990. The UAB has argued that consolidation of ARS would generate millions of dollars in savings which could be reallocated to upgrade remaining facilities and to invest in base and competitive funding.

In 1990 the UAB recommended that the system be overhauled using an External Peer Review Panel which I will describe in detail momentarily.

In 1992, the UAB once again urged the reform of facilities and stressed the importance of providing adequate maintenance of key facilities at the Beltsville, Maryland Agricultural Research Center, the Plum Island Animal Research Center in New York, and the National Animal Disease Control Center in Ames, Iowa.

The Administration and Congress have failed to act on any of the UAB recommendations I have briefly described.

The National Association of State Universities and Land Grant Colleges Recommendation

NASULGC has recommended that Congress fund a $100 million annual competitive facility grants program. This would be a coordinated Federal/State effort with an open, competitive selection process. The program would consist of two principle components. First, competitive facility grants (consisting of 80 percent of available funds) would be open to all eligible cooperating institutions. The second component would allocate competitive grants for smaller or emerging cooperating institutions. This recommendation was part of a larger recommendation aimed at halting the earmarking of agricultural research funding.[8]

The Agriculture Research Facilities Planning and Closure Study Commission

In 1990 the Congress passed legislation which established a commission, modeled after the military base closing commission, to deal with the problem of agricultural research facilities. The Commission was created for the purpose of establishing a coherent, comprehensive policy for America's agricultural research infrastructure.

The Commission was charged with reviewing all current and planned agricultural research facilities and recommending whether such facilities should be closed, realigned, consolidated or modernized. The Commission was also told to evaluate USDA's facilities acquisition and modernization system, and recommend improvements in the system.

The congressional appropriations committees have not funded the Commission. In 1991, the UAB wrote a letter to Senator Robert Byrd, Chairman of the Committee on Appropriations, expressing its disappointment that this Commission had not been funded and urged his support in FY 1993.

USDA SWAT Team

Secretary Madigan testified last summer before the U.S. Senate Agriculture Committee that a report on all facilities would be presented to the Hill in November 1992 as part of the USDA SWAT Team efforts to review field locations. So far no report has been issued. The SWAT Team briefings for congressional staff and the press have not included reviews of

[8] NASULGC, Agricultural Research Facilities, A Proposed Plan for Needed Investment, Jan. 1991 and America's Agriculture in the 21st Century, February 1989.

the agricultural research facilities, despite the fact that it was this issue that kicked off the call for infrastructural reform.

THE UAB PLAN FOR ACTION--EXTERNAL FACILITIES REVIEW PANEL

The UAB recommends the establishment of a National External Peer Review Panel to ensure accountability in facility planning and operations. The Panel would be an arm of the USDA and members would be appointed by the Secretary of Agriculture with recommendations from the Chairman and Ranking members of the Senate and House Agriculture Committees, National Academy of Science and other user, academic, and agri-industry organizations.

The Panel would be composed of individuals from both the public and private sector with expertise in science, engineering, management, research and development, and technology transfer. Panel members from Federal or University facilities being considered by the Panel must be excused from that particular evaluation and merit assessment. Administrative support should come from research agencies at USDA to carry out the duties of this Panel.

Purposes of the Panel would be to evaluate the status and progress of Federal and University agricultural research facilities for the Congress and the Secretary.

External Peer Review Teams

In addition to the Panel, the UAB recommends establishment of several External Peer Review Teams. The purpose of these teams would be to conduct on-site evaluations of existing Federal and University agricultural research facilities. Expenses for the Team evaluation would be incurred by the Facility submitting the proposal or being reviewed. These evaluations would be submitted to the Panel for the merit assessment being conveyed to the Secretary and the Congress.

The Teams would include individuals from the public and private sector in science, engineering, finance, business management, marketing, and like fields, with expertise in science/technical merit, management, research facilities, and technology transfer. Team members of Federal or University facilities being reviewed by the Team must be excused from that particular evaluation.

Strategic Planning

A number of actions would be necessary prior to the Team evaluations and merit assessments of the Panel. They are:

o All facilities or proposals would develop a clear and concise statement pertaining to their mission.

o All facilities or proposals would develop on an annual basis, a five-year written plan which describes who the organization is, where it is going, and how it is going to get there. This strategic plan would be used for management purposes and to facilitate evaluation of performance.

o Each facility and proposal would follow a standard outline in producing its strategic plan which would be provided by the Panel.

The Strategic Plan would reflect the unique combination of the Facility's interest and capabilities, and would discuss features of the Facility in sufficient detail to be evaluated in accordance with the guidelines and criteria.

The UAB recommends that the National Science Foundation (NSF) Guidelines for proposed Science and Technology Research Centers[9] be utilized in a modified form to address existing and proposed Federal and University agricultural research facilities.

Each Strategic Plan should contain the following elements and additional subsections:

Executive Summary. Provide clear descriptions of the Facility, its intellectual theme, and its distinguishing features.

Rationale for the Facility. Why is the Facility needed? What differences will this Facility make within the context of the total resources and Facilities available in the United States? What other Federal or University facilities are conducting similar research? How does this Facility relate to similar Facilities in the Nation, Region or State?

Description of the Intellectual Focus and Research. A Facility's intellectual theme should be sufficiently long-term to justify it. The Facility must have sufficient focus to have definable goals. Describe the proposed research goals and activities in adequate detail to allow assessment of their scientific merit and the need for use of the Facility mode of research. In addition, state the

[9] National Science Foundation, NSF-STRC report, 87-75

anticipated affects that activities carried out at the Facility will have on agriculture.

Educational Features of the Facility. What is the Facility's means of attracting high quality scientists or engineers?

Knowledge Transfer, Outreach, and Participation. The Facility must have clearly defined plans for involving and transferring knowledge to the agricultural community.

Management Plan. This must describe the organizational structure of the Facility, its mechanisms for focusing activities, selecting and integrating related research projects, and allocating funds and equipment.

Physical Structure for the Facility. Include a description of the available space and/or plans for new or renovated space, major items of equipment, maintenance requirements, and the estimated costs.

Institutional and Other Sector Support for the Facility. Provide details of committed and expected support from all sources.

Budget. A proposed five-year budget for the Facility must be provided.

Impact of the Facility upon the Nation's Economy. How has or will the Facility contribute to agriculture's economic growth?

Biographical Sketches and Individual Support. Provide a short biographical sketch and a list of the most recent and/or significant publications and activities of the key personnel, with a summary of each participant's current and pending research efforts.

Criteria

Facilities will be evaluated through a multi-tier merit review process. The first stage of review will be conducted by the External Peer Review Panel to assess adherence to the guidelines and preconditions for Federal and University facilities, including the scientific and economic development impact of the Facility. This phase of the review process may involve both ad hoc mail and panel reviews.

The full review process will involve a comprehensive review by the Teams convened for the sole purpose of evaluating existing Facilities. During the course of the review process, each

Facility will receive a site visit review. Site visit reviews will consider all aspects of the organization, including the facilities, technical staff, the mechanisms planned for the management, and ongoing evaluation of the work of the research Facility.

Facilities will be reviewed by the Teams to determine their ability to meet goals of Congress and the Secretary of Agriculture. Emphasis will be placed upon the extent to which the Facility has enhanced, or will enhance the economic well-being of U.S. agriculture. The review shall ascertain if the Facility meets national standards of excellence.

The following analyses of the Facility and submitted materials will be made during the review process:

Intrinsic merit of the intellectual focus and research. What is the scientific merit of the work being conducted? This criterion is concerned with the Facility's overall quality of research and the likelihood that the research will lead to fundamental advances within the field, new discoveries, and/or technological developments and commercialization. The presence of unique opportunities for technical innovation will be explored.

Research performance competence. This criterion relates to the capability of the investigator(s) and the adequacy of the resources that are committed to the Facility. An important issue here is the adequacy of existing or planned facilities.

Utility or transferability of the research. This criterion is used to assess the likelihood that the research can contribute to the achievement of a goal that is extrinsic or in addition to that of the research field itself and thereby serve as the basis for new or improved technology, or assist in the solution of agricultural problems.

Appropriateness of the Research Facility approach. Included in this criterion are the questions: Is the Facility's approach and structure essential to or appropriate to the research activities described? Will a Facility's approach add significantly to what could be done through other modes of research support?

Appropriateness of institutional and management plans and arrangements. This criterion relates to the likely effectiveness of management and the strength and form of commitments to the Facility. Important additional issues include: the reasonableness and appropriateness of the budget; the mechanisms proposed or in place to enable evaluation of the Facility's progress; and the nature and

level of commitment from other participants and/or sectors.

Effect of the Facility on the infrastructure of agriculture. This criterion relates to the potential of the Facility and the research being conducted there to contribute to better understanding or improvement of the quality, distribution, or effectiveness of the Nation's (agricultural) scientific research and educational capabilities. An important issue here is the way the Facility relates to other institutions and facilities on similar topical issues in the Nation, Region, or State.

Appropriateness and strength of linkages and knowledge transfer efforts to other sectors and groups. This criterion is used to assess where the Facility involves or has concrete plans to involve appropriate sectors and groups in the work of the Facility, and the form and strength of that involvement. Included here are questions about the appropriateness, form, and likely success of knowledge or technology transfer efforts.

Performance against Strategic Plan and goals. This section will fully evaluate the performance of the Facility in meeting its goals as set forth in its Strategic Plan.

The proximate, long-term economic development impact of the Facility. Among the criteria to be considered are the contribution to the body of basic research, development of new technologies, development of new processes, number of patents/copyrights issued, composition of industry clientele, etc.

CONCLUSION

Clearly, our present agricultural research facilities system needs an overhaul. We need a coordinated, coherent policy to maintain and promote America's agricultural research infrastructure. We need to consolidate and close outdated facilities; reinvest in existing facilities; and institute a national plan for building new facilities.

I urge the Subcommittee to work with the research and extension community and come to a consensus on a national, cohesive strategy for agricultural research. Without such a plan, it will be difficult to measure the "fit" of any existing or proposed research facility and determine whether it merits our limited Federal funding.

Mr. Chairman and members of the Subcommittee, I have cited a decade of UAB recommendations about research facilities and strategic planning. In fact, in just its third report (October

68-792 - 93 - 4

1981), which was written while the Board was still organizing itself, the UAB identified Planning and Priority Setting as its second critical issue. That report said, "We seem to have more needs and more ideas of how to address those needs in agricultural science than we have public resources to meet them."

The current Board fully agrees with that statement. What agricultural research needs in an effective national planning and priority setting process - a process that allocates precious resources to the most important needs and best ideas, and refrains from funding those at the bottom of the list.

The UAB remains committed to confronting the facilities issue. Better planning and management of our agricultural research facilities is crucial to the success of our science and education system. We look forward to working with the Subcommittee as you face the challenge of facility reform.

ANSWERS TO WRITTEN QUESTIONS SUBMITTED TO DR. JAMES KLOEK, PANELIST FOR MARCH 25, 1993 HEARING - REPRESENTATIVE STENHOLM PRESIDING

1. How does the erosion of base programming at research facilities influence "critical mass" to accomplish good scientific results? That is, if there are too many support staff and not enough scientists, what will be the result?

Answer: At one time, a small laboratory operation was capable of making excellent progress; today, an interdisciplinary group or "critical mass", often with highly sophisticated and costly equipment, is required to solve pressing agriculture problems. This work is undermined, however, when program funds are siphoned off to support brick and mortar instead of the scientists and equipment that are needed. There is also a "Catch 22" effect because buildings require a certain number of administrative and maintenance employees which is often offset by a reduction in the number of scientists.

2. The CSRS has estimated that it will cost $430 M to complete facilities already in the hopper. I imagine the situation at the ARS is similar. What would you recommend be done with those projects?

Answer: According to USDA estimates done in FY 1990, a total of $348,434,000 was needed for ARS's 1990 repair needs. That is a staggering amount compared to ARS's overall 1990 research budget of $456,434,000. In other words, for every dollar spent on research, ARS would have to spend and additional $.76 on repair. Putting this is an agricultural context, we are eating our seed corn.

This trend can not continue but obviously we can't just walk away from all the buildings under construction. As stated in my testimony, it is the UAB's position that an overall strategic plan must be developed for agricultural research and that Congress use this plan to evaluate current and proposed construction. Those projects that don't address the objectives in the strategic plan must be abandoned. There simply isn't enough money to do them all.

3. You mention in your testimony that the ARS system has 1,074 square feet of research space per employee. How does this compare to what industry has?

Answer: In industry there is about 500 square feet per employee, which includes scientists and support staff. The typical industrial lab is 600 square feet with an additional 120 square feet for office space for 2 to 4 scientists and technicians.

4. How much of a priority should be placed upon renovation of existing facilities as opposed to construction of new?

Answer: Too many existing and proposed facilities are supported for their limited geographic locations vs their ability to address critical issues. Funds for brick and mortar, whether is be new or renovation, should be evaluated in terms of the contribution the laboratory will make in advancing the objectives of the overall strategic plan. This should be the highest priority and the guiding hand.

5. We appreciate your understanding of the budget realities we are facing. If we fail to begin prioritizing research and facilities, how effective do you feel our agriculture research will be in 5 or 10 years.

Answer: The lack of a prioritized list of research goals and facilities means that U.S. agriculture isn't making the best and most intelligent use of the technologies that have been developed over the last ten years. Our comparative advantage will be seriously threatened in 5 or 10 years. Here again, Mr. Chairman, we're eating our seed corn.

Statement by

Susan E. Offutt
Executive Director
Board on Agriculture, National Research Council

before the
Subcommittee on Department Operations and Nutrition
House Committee on Agriculture

25 March 1993

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to testify during your review of current agricultural research and education priorities. My remarks address funding support for agricultural research through competitive grants, and the new study on the role of the colleges of agriculture and the land grant university system that is being undertaken by the Board on Agriculture.

The relation between agriculture and public research institutions in land grant universities and federal agencies has been a long and beneficial one. Widely credited as the engine that has driven the substantial achievements of American farmers, the nation's agricultural research system has, with growing frequency, been cited as a model in the design of similar research and development partnerships for other parts of the industrial base. However, it diminishes none of the achievements of the past to suggest that the agricultural, food, and environmental system should now concentrate on its future.

Funding Agricultural Research

Of concern is the mechanism by which agricultural research is funded. Sustained over a century by federal formula grants matched by state contributions, the system has more recently experimented with competitive grants. In 1989, the Board on Agriculture of the National Research Council made a proposal to mobilize the nation's scientific and engineering communities to advance the quality of agriculture, the food supply, and the

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Susan E. Offutt, Ph.D., is Executive Director of the Board on Agriculture, Washington, D.C. The Board on Agriculture is one of ten major units within the National Research Council. The Council is the principal operating agency of the National Academy of Sciences.

environment through significant expansion of competitive research grants. The Board on Agriculture proposal -- which became the National Research Initiative (NRI) -- recommended new monies for agricultural research at the level of $500 million annually, distributed among six broad program areas: plant systems; animal systems; nutrition, food quality, and health; natural resources and the environment; engineering, products, and processes; and markets, trade, and policy. Authorization for the full $500 million program was included in the 1990 farm bill.

The Board argued that implementation of the NRI would ensure the continued benefits of high return to investment in agricultural research, encourage the participation of the entire science community in agricultural work, provide flexibility and response to utilize new scientific discoveries and technologies for agriculture, and advance U.S. agriculture while contributing advances in relevant scientific fields, such as biomedicine and ecology. The hope was that, when fully funded, the NRI would make grants of larger size and duration than under the then existing competitive grants program within USDA. Specifically, those grants would be made as four types: (1) to individual principal investigators, (2) to multidisciplinary teams working on basic research, (3) to mission-linked multidisciplinary teams, and (4) to institutions and individuals to strengthen the U.S. research capacity.

The Board's proposal for enlarging the research commitment for agriculture through competitive grants was endorsed by the U.S. Department of Agriculture (USDA). The Bush Administration subsequently proposed to the Congress that the existing competitive research grants program be expanded by $50 million annually. And, the Congress responded with an increase in the appropriation from about $43 million to $73 million. The next year, in FY1992, the NRI funding level was set at $97.5 million.

Considered against the backdrop of an increasingly constrained federal budget allocation for all agricultural programs, the NRI has enjoyed remarkable success. By FY1993, however, the strictures of the 1990 budget summit were being felt; NRI funding stalled at the previous year's level of $97.5 million. While all six categories received some measure of funding by FY1992, the NRI is still some way from its overall goal and from being able to fulfill the Board's hope that individual grants would average $100,000 per year (compared with the current average $50,000) and last longer (for three to five years, compared with the current average one to two years); and that appropriate levels of support would be available for the six program areas and four types of grants.

As argued by the Board in Investing in Research: A Proposal to Strengthen the Agricultural, Food, and Environmental System (National Academy Press, 1989), the competitive grant is the

proven and appropriate mechanism to stimulate new research in high-priority areas of science and engineering. It is flexible, reaches a large pool of talented scientists, and provides a balance to the overall research program, thereby ensuring high-quality research.

Responsiveness and flexibility in altering the direction of exploratory research are critical to maintaining scientific excellence. A competitive grants program capitalizes on the skills and experiences of leading scientists in recognizing the need for new directions in science. Because funding commitments to any one project are for only 3 years to 5 years, this mechanism is flexible and responsive to rapid advancements in science, thereby allowing resources to be targeted at the most promising areas of scientific research in each grant cycle. Open competition and critical review by scientific peers helps secure scientific excellence.

Sufficient funding over an adequate period of time is the best way to attract talented scientists from a variety of disciplines. The expanded competitive grants program will more adequately support researchers within the agricultural research system and will also open the system to scientists from other disciplines who have not previously participated in the USDA grants program. These scientists should be, but are not now, applying their skills to agricultural research.

An expanded competitive grants program will provide the needed balance among the funding mechanisms that support USDA's R&D: intramural programs, formula funding, special grants, and competitive grants. Competitive grants are a significant source of funding within other federal agencies. At the National Institutes of Health (NIH) and the National Science Foundation (NSF), well in excess of three-fourths of R&D support, respectively, is distributed through competitive research grants. USDA should not, however, attempt to mirror NIH and NSF in the proportion of funds it distributes on a competitive basis. For example, problems specific to certain crops, technologies, and regions are often best addressed through formula funds or special grants. Long-range research, such as the development of improved plant and animal germplasms, or tracking of the diets and nutritional status of a group of children as they grow, for example, are more effectively supported on a continuing basis through intramural funding.

Future of the Land Grant Colleges of Agriculture

The Board on Agriculture proposes to undertake a three-part project, an examination of the land grant colleges of agriculture -- and related units for natural resources, human ecology, and veterinary medicine -- and the ways in which their tripartite

mission of teaching, research, and extension can be, and is being, adapted to a changing clientele, changing social needs, and an expanding science and technology base. The Board recognizes that activities in support of that mission take place outside the colleges of agriculture, for example, when disciplines in the life sciences are found in a separate administrative unit. So, although the focus of the study would be the colleges of agriculture, when it seems appropriate, resources and institutions outside of the colleges would be considered in their contribution to the colleges' mission.

The primary goal of the Board's study is to provide the continued success of the land grant colleges of agriculture in supporting the nation's wise and sustainable use of its natural resources in the production and utilization of food and fiber. A secondary goal is to examine the relevance of the tripartite mission of the colleges of agriculture as a model for the wider university, scientific, and public policy communities.

The study's objectives are intended to support its goals through the emphasis on understanding the challenges and opportunities faced by colleges of agriculture nationwide. The committee of experts appointed to pursue the study would make full use of existing, extensive data bases on the system's stock of human, physical, and financial resources. The committee will also interact directly with the system and its clients in identifying institutional innovations and models of creativity that might be widely applied. The Board conceives the study as having three main objectives:

- to describe trends and contemporary patterns of resource allocation and program effort in the colleges as well as characteristics of the nation's farm and food system and its consumers;

- to analyze the colleges' role in providing instruction, performing research, and transferring new knowledge and technology according to the priorities it has set for itself and the expectations of its public;

- to synthesize findings on organization and resource allocation that define strategies with broad application through the system.

The Board anticipates the outcome of the study as the identification of organizational and management strategies that promote effective use of the colleges' limited resources. Collaboration, within and between colleges, is expected to be a key theme that recognizes the value of interdisciplinary work in problem-solving and the need for pooling resources or delegating responsibilities across state boundaries. Strategies for

altering faculty rewards and incentives or setting priorities to serve multi-state clientele would be two possible examples. These strategies would recognize current resource endowments while anticipating change in the future. The study itself, which will include regional workshops, can catalyze new associations and consensus-building within the college and also between the agricultural and the broader university and research communities.

The Board does recognize that such innovations will not be imposed by federal fiat; the decentralized nature of the agricultural research, teaching, and extension system obviously precludes that. However, the system has a long history of operating through consensus, and the Board expects to draw on that tradition in promoting "knowledge transfer." By the same token, federal support for the nation's system is predicated on its serving national priorities, and it seems unwise to suppose that a "laissez-faire" system of priority-setting will always produce optimum results. So, the Board believes it is likely that the study's findings will have implications for the conduct of the federal-state partnership.

The majority of funding to support the study has been pledged, and the Board hopes to convene its committee during Summer 1993.

Dr. Susan Offutt

1. How do the priority-setting mechanisms for agricultural research need to change to include more involvement from producers and consumers?

   In its report, Investing in Research (attached), the Board on Agriculture considered how consumers and producers and others with a stake in the productivity of the food and agricultural system should be included in setting the agenda for an expanded competitive grants program. The role of advisory committees in program planning is addressed at length, beginning on page 89 of the report.

2. In general, how effective do you feel Congressional involvement has been in the past? How could this be improved?

   In Investing in Research, the Board emphasized the importance of evaluating the effects of the competitive grants program. This topic is discussed on page 92 on the report. The Congressional responsibility for oversight of executive branch agencies would surely include the consideration of improved and expanded evaluation of these programs' efficacy.

3. How should priority-setting mechanisms change to ensure the correct balance of both basic and applied research missions?

   The Board considered the relationship between basic and applied science extensively in its report Investing in Research. Chapter 5, "Program Areas and Scientific Opportunities," systematically considers, for each major category of grant activity, what relationships exist between scientific areas and areas of practical or potential application.

4. Some individuals advocate a more regional approach to the distribution of formula funding. Are the present efforts made on these lines adequate or could they be increased?

   In its study of the future of the land grant colleges of agriculture, the Board will explore this question by comparing regional agricultural and natural resource bases to research capacity in the region's universities. Opportunities for improving the performance of teaching, research, and extension programs based on regional considerations will be explicitly considered.

5. As budget pressure brought on by the deficit increases, how might we change our allocation of formula funding, competitive grants, and special grants to more effectively meet our needs?

   The Board proposed a major increase in the size of the USDA competitive grants program, to $500 million annually, as described in Investing in Research Chapter 1. While the Board believes a mix of formula, competitive, and special grants is appropriate, its priority is an increase in the size of the competitive grants program.

(Attachment follows:)

INVESTING IN RESEARCH

A Proposal
to Strengthen the Agricultural,
Food, and Environmental System

Board on Agriculture
National Research Council

NATIONAL ACADEMY PRESS
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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

The National Academy of Sciences is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Frank Press is president of the National Academy of Sciences.

The National Academy of Engineering was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Robert M. White is president of the National Academy of Engineering.

The Institute of Medicine was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, upon its own initiative, to identify issues of medical care, research, and education. Dr. Samuel O. Thier is president of the Institute of Medicine.

The National Research Council was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Frank Press and Dr. Robert M. White are chairman and vice chairman, respectively, of the National Research Council.

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Preface

The United States was once much richer than the rest of the world and, particularly in agriculture, was more productive. Once, the United States could manufacture products that the rest of the world lacked the technology to make, and could grow and export farm products in quantities and with a quality that no other country could match. U.S. exports did not compete with products from the rest of the world—rather, the United States was the locomotive of the world economy.

Now, however, this nation's economic superiority can no longer be assured. The United States is only one of several countries of major industrial and agricultural strength. As the United States' almost effortless economic superiority was replaced by equality, the U.S. share of the world's gross national product fell from more than 50 percent after World War II to about 22 percent in the late 1980s. The products that the rest of the world lacked the technology to make are now made by many countries in a world of increasing technological parity. Advances in agricultural production in the developed and developing regions have sharply curtailed foreign markets for U.S. farm products. Instead of being a major exporter of raw materials, the United States is now a major importer of some products (Thurow, 1989).

New and complex challenges therefore confront U.S. agriculture—the challenges of responding to aggressive competition on a global scale, ensuring good nutrition and a high-quality food supply for all our people, safeguarding our natural resources, and enhancing our environment. But at the same time, we are still leading the world in the biological sciences central to our agricultural sector. It is therefore encouraging to consider the manifold opportunities for progress. For example, advances in modern genetics can be applied throughout the agricultural, food, and environmental system; and new environmental and engineering methods can help maintain both the quantity and quality of groundwaters and surface waters.

The challenges confronting agriculture must be addressed in two stages. First, leadership is required to set and implement new priorities so that the most critical problems can be solved and opportunities exploited. Second, the necessary physical and intellectual resources must be allocated.

In this report, the Board on Agriculture of the National Research Council presents a proposal for a major new funding initiative designed to meet these challenges. The report describes a course of action that will resolve key problems in agriculture, advance the sciences that undergird the nation's agriculture and the quality of U.S. natural resources, and enhance the nation's well-being. The board calls for a substantial increase in federal funding for research and recommends application of these funds through competitive grants. At the same time, the board recognizes the nation's need to meet federal deficit reduction goals and the need to balance alternative priorities.

Agriculture, as the Board on Agriculture defines it, encompasses the entirety of the system that grows and processes food and fiber for the nation. It also encompasses the related natural resources, public policy issues, social systems, and physical and biological environments. The term agriculture, food, and the environment is used to communicate the full meaning of agriculture in this broad sense.

Self-initiated activity of this kind is unusual for the Board on Agriculture, which generally provides detailed assessments and analyses of issues only at the request of a federal agency or the U.S. Congress. However, the significance of agriculture for the U.S. economy and the critical role of research in ensuring agricultural progress impelled the board to prepare

this proposal. The board believes that now is the time to take advantage of recent scientific and technological advances to solve problems in the areas of competitiveness, the food supply, and natural resources stewardship. The sectors contributing to the agricultural, food, and environmental research system—the land-grant universities, other universities, agencies of the U.S. Department of Agriculture, the scientific societies, and others—are also now making the case for strengthening U.S. agriculture through science. Indeed, concurrent with and wholly independent of the board's initial work, a group of state agricultural research leaders discussed a need for action similar to that proposed here.

Investing in Research is the latest in a series of Board on Agriculture reports that began with the 1972 *Report of the Committee on Research Advisory to the U.S. Department of Agriculture*. Subsequent reports dealt with problems of world food production, genetic vulnerability, genetic engineering, natural resources, education in agriculture, control of pesticides in food, designing foods, and research priorities. *Investing in Research* builds upon that foundation.

Chapter 1, the executive summary, summarizes the proposal for an expanded competitive grants program within the U.S. Department of Agriculture and an infusion of new money into it. Chapter 2 presents the proposal and describes its major parts. Chapter 3 explains the rationale for major points of the proposal. Chapter 4 gives a review of the major challenges facing the agricultural, food, and environmental system. Chapter 5 delineates the six program areas necessary to encompass the needs of the system satisfactorily. Chapter 6 outlines the institutional and administrative issues involved in the implementation of the proposal. The report concludes with a set of appendixes covering funding trends for the agricultural, food, and environmental sector; budget priorities; current program objectives; and other documents relevant to this report.

The board expects—indeed, welcomes and encourages—discussion and refinement of this proposal and then implementation of its recommendations.

This proposal presents an investment opportunity in the classic sense. The investment entails some risk and will not produce immediate results. Yet, it will provide the basis for a new competitive position for agriculture, an improvement in human health and well-being, and improved stewardship of our natural resources.

Strengthening, revitalizing, and energizing U.S. agriculture will be difficult but far from impossible. We have done it before.

Theodore L. Hullar
Chairman

Acknowledgments

The Board on Agriculture's proposal to strengthen the agricultural, food, and environmental research system is the synthesis of the creative thinking and ideas of the many individuals and organizations that share our concerns about quality science and innovation. We thank all those who generously contributed their thoughts, expertise, time, and encouragement.

These individuals include representatives of professional societies; leaders of the state agricultural experiment station system; faculty members and scientists at a number of universities; and senior scientists at the National Institutes of Health, the National Science Foundation, and the U.S. Department of Energy. We especially thank administrators and scientists at the U.S. Department of Agriculture not only for their assistance in data compilation but also for their insights.

The efforts of countless individuals throughout the scientific, agricultural, and public policy communities are far greater than can be represented by the contents of this book. For all those who are committed to a strong U.S. agricultural system, we thank you.

The members of the Board on Agriculture also acknowledge the contributions of the staff in preparing this proposal. We extend special appreciation to Mary Lou Sutton, whose diligence carried us through many drafts in the process of attaining our final report.

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Executive Summary

This is the technological age. It is also an age of opportunity. U.S. agriculture continuously evolves, but the pace of change is now more dramatic than ever. In the life sciences, new knowledge and instrumentation are rapidly expanding the understanding of plants, animals, and microbes; providing new opportunities to control disease and pests; and improving the quality of agricultural and food products. Equally complex changes are occurring in international trade, where the new rules of the global marketplace are transforming old patterns of competition.

In the agricultural system, as with other segments of U.S. industry, the problems of the twenty-first century intensify more quickly than ever before, and opportunities must be seized immediately, before their peak of potential benefit has passed. The ability of the United States to resolve the spectrum of issues and related problems in agriculture—nutrition, economics and international trade, production efficiency, natural resources conservation, control of pollutants, and others—depends on depth of knowledge, the available tools and technologies, and the skill and insight to apply them.

The United States needs to invest in the future—in human capital and the scientific knowledge base—to revitalize and reinvigorate one of its leading industries, the agricultural, food, and environmental system, in its broadest sense. A sound investment strategy for research is fundamental to sustain economic performance, to respond competitively to the increased economic strengths and manufacturing capacities of other nations, and to maintain the U.S. quality of life. The commitment called for in this proposal should therefore be part of a national agenda to strengthen the United States.

URGENCY FOR CHANGE

Major challenges confronting the nation now center on the competitiveness of U.S. agricultural products in global trade, the safety and quality of the U.S. food supply, and the management and sustainability of the country's natural resources.

Competitiveness

The United States faces new and aggressive competition from abroad. The balance of trade has gone from positive to negative, making the United States a debtor nation. The strong role that agricultural exports played in the U.S. balance of payments has weakened. U.S. global competitiveness in agricultural commodities and food products has eroded because of increased costs of production at home and heightened competition from foreign producers in the marketplace. Given the high U.S. production capacity, regular surpluses of major commodities, and the imperative of deficit reduction, the needs for profitable new uses for agricultural products, more cost-efficient production, and new markets remain high.

Human Health and Well-Being

Nutritious and high-quality food is available to U.S. citizens. However, problems are arising that must be resolved, such as excessive fat in the diet, the incidence of microbial contamination, and pesticide residues on food.

U.S. citizens consume too many saturated fats. Although red meat and dairy products provide 36

percent of food energy and 100 percent of certain nutrients, they also contribute more than half of the total fat, nearly three-fourths of the saturated fatty acids, and all of the dietary cholesterol in the U.S. diet (National Research Council, 1988a). Agricultural research is focusing on ways to produce leaner animals and to process nutritious foods with reduced levels of saturated fats and cholesterol.

Salmonella species and *Campylobacter jejuni* from all sources are each responsible for up to 2,000 cases of gastroenteric disease per 100,000 people per year in the United States (National Research Council, 1985a). Illnesses caused by these microorganisms tend to be most severe among the very young, the very old, or patients with immunosuppressive diseases. New research can determine points at which known pathogens enter the food supply and can contribute to improving methods for detection, monitoring, and control.

Although potential cancer risks from ingesting pesticides in the diet are small in comparison with the potential risks from other known causes of cancer, the pesticide residues on fruits and vegetables are a growing public concern. Research can provide new insights into levels of dietary risk and can identify new alternatives that will ensure the producer a high-quality crop while reducing the need for pesticide application.

Natural Resources and the Environment

Concern for prudent natural resources stewardship and a clean and sustainable environment is now focusing on issues such as contamination of surface water and groundwater by natural and chemical fertilizers, pesticides, and sediment; the continued abuse of fragile and nutrient-poor soils; and suitable disposal of municipal, industrial, and agricultural wastes.

Water pollution is probably the most damaging and widespread environmental effect of agricultural production. Various estimates of the potential financial costs of surface water contamination from agricultural production are in excess of $2 billion per year. Groundwater is the source of public drinking water for nearly 75 million people. This fact is significant because accumulating evidence indicates that a growing number of contaminants from agricultural production are found in underground water supplies. Although research is being conducted in these areas, a major increase in support will be required to adequately investigate and apply new knowledge and technologies to curtail surface water and groundwater contamination.

Soil erosion remains a serious environmental problem in parts of the United States, even after 50 years of state and federal efforts to control it. New data indicate that the intensive tillage practices associated with continuous monoculture or short crop rotations may make soils more susceptible to erosion. New knowledge will provide improved ways to estimate erosion, decrease the displacement of soils by wind and water, and develop federal policies for conserving fragile lands.

Waste disposal facilities all over the United States are reaching their capacities to contain and decompose plant and animal residues, pesticides, food processing wastes, sewage, and industrial sludges. Research in the agricultural, food, and environmental sciences can help minimize the production of waste materials, develop technologies to increase recycling, and develop improved systems for ecologically safe waste disposal systems.

New Knowledge

Solving the problems of competitiveness, a high-quality food supply, and natural resources and the environment will require much more new knowledge than was required to solve previous problems. An example illustrates the point: Genetically engineered biocontrol agents for pest management are now being designed on the basis of current knowledge, but it will likely take a 10-fold increase in understanding of the biology of such agents and their survival and action in various ecosystems before such engineered biological control agents can be effectively developed and used. The knowledge needed must come from a number of disciplines, such as biochemistry, genetics, physiology, plant pathology, entomology, plant biology, ecosystems analysis, agronomy, and economics, among others. The specific disciplinary knowledge must then be integrated into effective production systems. The knowledge required far transcends that necessary for the current chemical-based technologies.

The necessary new knowledge is unlikely to be acquired and expediently applied without substantial new funding.

This proposal for investment in research for the agricultural, food, and environmental system aims to establish the new knowledge base necessary to address the problems.

THE PROPOSAL

The purpose of this proposal—as well as the challenge it presents—is to mobilize the nation's scientific and engineering communities to advance the quality of agriculture, the food supply, and the environment.

This proposal presents a program to strengthen the focus of U.S. science on agriculture. The premise is that a judicious but substantial increase in research funding through competitive grants is the best way to sustain and strengthen the U.S. agricultural, food, and environmental system.

Implementation of this research proposal will

- Capture the proven high economic return on investment in agricultural research.
- Secure for agricultural research a full array of talent from the entire U.S. science and technology research sector.
- Expand knowledge in all the disciplines underpinning agriculture while also contributing to advances in other broad areas such as biomedicine, ecology, engineering, education, and economics.

This proposal, which is composed of the following specific elements, should be evaluated as a singular strategy for action.

An Expanded Public Investment

Research support for agriculture, food, and the environment should be increased by $500 million annually. This increase should support competitive grants administered through the U.S. Department of Agriculture's Competitive Research Grants Office.

This competitive grants program should be increased to support the need for research in public and private universities and colleges; not-for-profit institutions; the U.S. Department of Agriculture's (USDA's) Agricultural Research Service, Economic Research Service, and U.S. Forest Service; and other research agencies of the state and federal governments.

Funds should come from new monies, not from the redirection or reallocation of existing research and education programs, including formula-funded programs.

Program Areas and Scientific Scope

The expanded proposed competitive grants program should encompass all science and technology relevant to research needs for agriculture, food, and the environment. To do this, six program areas should be established: (1) plant systems; (2) animal systems; (3) nutrition, food quality, and health; (4) natural resources and the environment; (5) engineering, products, and processes; and (6) markets, trade, and policy.

Agriculture has vastly overgrown its early bounds of planting and harvesting crops and nurturing livestock as sources of food and fiber. It is a major influence on and component of industry, world trade, and global ecology. The six program areas establish a framework that will accommodate all areas of research relating to agriculture, food, and the environment. Research in the six program areas using all relevant disciplines of science and technology is essential to solve current and emerging problems.

Examples of some of the major topics within the six program areas are as follows.

- *Plant Systems:* plant genome structure and function; molecular and cellular genetics and plant biotechnology; plant-pest interactions and biocontrol systems; crop plant response to environmental stresses; improved nutrient qualities of plant products; and new food and industrial uses of plant products.
- *Animal Systems:* cellular and molecular basis of animal reproduction, growth, disease, and health; identification of genes responsible for improved production traits and resistance to disease; improved nutritional performance of animals; and improved nutrient qualities of animal products.
- *Nutrition, Food Quality, and Health:* microbial contaminants and pesticide residues related to human health; links between diet and health; bioavailability of nutrients; postharvest physiology and practices; and improved processing technologies.
- *Natural Resources and the Environment:* fundamental structures and functions of ecosystems; biological and physical bases of sustainable production systems; minimizing soil and water losses and sustaining surface water and groundwater quality; global climatic effects on agriculture; forestry; and biological diversity.

• *Engineering, Products, and Processes:* new uses and new products from traditional crops, animals, by-products, and natural resources; robotics, energy efficiency, computing, and expert systems; new hazard and risk assessment and mitigation measures; and water quality and management.

• *Markets, Trade, and Policy:* optimal strategies for entering and being competitive in overseas markets; new decision tools for on-farm and in-market systems; choices and applications of technology; and new approaches to economic development and viability in the rural United States and developing nations.

Grant Types

In each of the six program areas, four types of competitive grants should be available: (1) principal investigator grants, (2) fundamental multidisciplinary team grants, (3) mission-linked multidisciplinary team grants, and (4) research-strengthening grants.

Principal investigator grants should support individual scientists or coinvestigators working within the same, or closely related, disciplines. Principal investigator grants are the foundation of the highly successful competitive grants programs in the United States, and they are the major way to attract and retain talented scientists and their students into areas of research.

Fundamental multidisciplinary team grants should support collaborating scientists from two or more disciplines focusing on basic science or engineering questions. It is often at the juncture of disciplines that new discoveries and research strategies are made.

Mission-linked multidisciplinary team grants should support multidisciplinary research focusing on more applied problems of national significance and should be linked to, among others, the Cooperative Extension Service (CES), the Agricultural Research Service (ARS), and industry. Funding through this grant type will facilitate the application of knowledge and the transfer of technology to the user through joint research-extension studies.

Research-strengthening grants should competitively support institutions through program grants and individuals through fellowships to increase the U.S. research capacity.

Attention to Multidisciplinary Research

The expanded competitive grants program should give major emphasis to supporting both fundamental and mission-linked multidisciplinary research teams. Up to 50 percent of the funding awarded for USDA's competitive grants should support multidisciplinary research.

The significance of multidisciplinary research to the success of the competitive grants program cannot be overemphasized. Many fundamental scientific and technological questions—and certainly the more applied problems—are multifaceted. To deal with their inherent complexity and diversity, it is necessary to establish multidisciplinary grants and make them a major feature of the expanded program.

Strengthening Institutions and Human Resources

Research-strengthening grants to institutions and individuals should be a key component of an expanded competitive grants program.

Research-strengthening grants are essential for two reasons. Grants to institutions improve the research capability at institutions and in departments that aspire to, but have not attained, nationally recognized research and development (R&D) capabilities. Fellowships increase the training and experiences available to pre- and postdoctoral fellows in agricultural, food, and environmental research. Expanding the number of women, underrepresented minorities, and disabled individuals in the research system must be integral to the entire program. The research-strengthening grant is a major way to provide those opportunities. The grants are not intended to be used for buildings or major capital expenditures.

Size and Duration of Support

The size and duration of USDA competitive grant awards should be increased substantially. The average size of a grant should be at least $100,000 per year per principal investigator; the duration of a grant should be at least 3 and as many as 5 years.

The size and duration of awards reflect the capability of a program to attract top-quality scientific and engineering talent. The USDA Competitive Research Grants Office should award grants that are adequate to conduct effective research and that are comparable in size and duration to those awarded by the National Science Foundation (NSF) and the National Institutes of Health (NIH), the two institutions in the United States with the largest and most successful grants programs. The proposed changes in size and duration will attract more top scientists in a variety of disciplines and thus increase the capacity to educate their students—the nation's future scientists.

RATIONALE FOR THE PROPOSAL

Key parts to the rationale for the expanded program include the need for a federal initiative; the need for a large increase in funding; the justification for new money, not for the redirection of current funds; the suitability of USDA as the central agency for the expanded program; and the appropriateness of competitive grants as the funding mechanism.

A Federal Initiative

A federal initiative for increased research support is needed because the issues and fundamental research needs are national in scope, and the nation as a whole, not just a state or region, is the beneficiary. In addition, states lack the funding to advance basic science across the full range of areas requiring immediate attention. In the private sector, the rate of R&D growth, which has been strong since the mid-1970s, is likely to level off in the decade ahead, and it may decline somewhat. Moreover, private sector research is focused on creating opportunities to market products and services, whereas much of the research most important to society and the nation is not market-related.

A $500 Million Increase

A $500 million increase in research funding is justified for at least three major reasons. (1) The pervasive needs and problems require large amounts of new knowledge and technology for their resolution, as discussed earlier. (2) Agricultural research provides a high return on investment. (3) The agricultural research system, as presently funded, is unable to provide the necessary financial support for the quality, amount, and breadth of science and technology necessary to address the problems.

Agricultural research characteristically gives a high annual return on investment, more than 45 percent (Fox et al., 1987). The contributions of research conducted within the competitive grants program will, in addition, bring advances not only to agriculture, food, and the environment but also to other scientific disciplines and other sectors of society. Discoveries that were made in efforts to resolve agricultural problems have already led to major advances in biology and medicine. Findings from research with plant models, for example, will lead to advances in the understanding of basic genetics and gene expression. Over time, the research results and their application will significantly decrease both regulatory and environmental costs.

Adequate funding through the six proposed program areas must be available to support the best and brightest researchers currently working in agriculture and to attract top researchers in other disciplines who have not previously participated in USDA programs. Current funding cannot do either.

Researchers' proposals for scientific inquiry are currently funded at levels that are too low to meet the demands of high-quality science. The average annual grant size from USDA is $50,000, in contrast to average annual grant sizes of $71,300 from NSF and $154,900 from NIH. USDA grants average 2 years in contrast to 3 years or more for NSF and NIH. In addition to funding grants at a higher level, both NSF and NIH fund a much larger number of grants. In fiscal year 1988, USDA awarded approximately $40 million for competitive grants, in contrast to the $265 million awarded by the Directorate of Biological, Behavioral, and Social Sciences at NSF and the $632 million awarded by the National Institute for General Medical Sciences (NIGMS), which is only 1 of the 12 institutes of NIH. All of the institutes that make up the NIH together awarded $6.4 billion in competitive research grants in 1988. Research supported by NIGMS is broad, covering all areas of fundamental biomedical science that bridge the responsibilities of all the institutes within NIH. Research supported by the USDA's competitive grants program is narrow, covering only some of the six program areas recommended in this proposal.

The proposed increase of $500 million would expand the current competitive grants program level of $50 million to an annual total of at least $550

million. The overall $550 million program should support the following four types of grants:

1. About 800 principal investigator grants for an average duration of 3 years. Total annual expenditure: $250 million.
2. About 180 fundamental multidisciplinary team grants for an average duration of 4 years. Total annual expenditure: $150 million.
3. About 60 mission-linked multidisciplinary team grants for an average duration of 4 years. Total annual expenditure: $100 million.
4. Research-strengthening grants to institutions for programs and to individuals for fellowships. Total annual expenditure: $50 million.

The expansion of USDA's competitive grants program by $500 million from its current level of $50 million will enable USDA to significantly support the innovative science that is poised to proceed—as soon as funding can be obtained.

Support with New Money

Support of the competitive grants program with new money will reverse the consequences of no R&D growth in agriculture and sustain the state-federal partnership.

The publicly funded research system has not been able to investigate many scientific questions comprehensively because fiscal constraints have allowed little, if any, real growth in R&D expenditures. From 1955 through 1988, research funding for USDA remained virtually stable in constant dollars, corrected for inflation. The purchasing power actually decreased, and higher costs are associated with the potent but costly instruments and supplies required by today's researchers. In 1988 USDA's total annual R&D funding was only 4.6 percent of the total R&D funded by the federal government, exclusive of the Department of Defense. Unfortunately, the lack of growth in USDA's support for R&D from 1955 through 1988 did not allow sufficient advancement in scientific knowledge. The agricultural sector cannot progress under the current level of funding; it can only fall behind.

The lack of real growth in R&D expenditures during the past 30 years has slowed research within U.S. agriculture and other areas of science. Opportunities are missed, such as the relatively slow application of biotechnology to agricultural issues; problems have increased, such as the need for new uses for commodity crops and for improved new crops for better nutrient composition and postharvest quality. At the same time, however, science and technology in other countries are advancing rapidly. Without a new infusion of funds, there will be insufficient support for the talented researchers with new ideas that can refuel scientific advancement in U.S. agriculture. Furthermore, without new funding, prospective students and new Ph.D. graduates will not be attracted to careers in agriculture or retained in them.

Most states support research at land-grant universities and state agricultural experiment stations (SAESs) far in excess of the matching formula funds they receive from the federal government. A substantial portion of this state support goes to research on fundamental scientific problems of national importance. Increased federal support for competitive grants will ease that burden and allow more of the state funds to be used for problems specific to that state or region.

Redirection of funds from intramural or formula-based programs to competitive grants would be counterproductive. The delivery system—SAES scientists and extension specialists and advisers, in combination with government and the private sector—is already unduly stressed, and redirection would exacerbate staffing insufficiencies for ARS, CES, and SAESs.

The Central Role of USDA

USDA is the federal agency responsible for advancing the agricultural sciences and developing technology applicable to food, fiber, and forest product industries. It is the entity best suited to administer the agricultural, food, and environmental competitive grants program.

The competitive grants program will warrant status as an independent office within USDA's Office of Science and Education, setting its administrator on a par with the administrators of the Agricultural Research Service, Cooperative State Research Service, and Extension Service as the managers of USDA's science, education, and training activities. As the USDA competitive grants program grows from about $50 million to $550 million in annual awards, changes in administrative procedures and institutional relationships will be essential.

Competitive Grants

The competitive grant is the proven and appropriate mechanism to stimulate new research in high-priority areas of science and engineering. It is flexible, reaches a large pool of talented scientists, and pro-

vides a balance to the overall research program, thereby ensuring high-quality research.

Responsiveness and flexibility in altering the direction of exploratory research are critical to scientific excellence. A competitive grants program capitalizes on the skills and experiences of leading scientists in recognizing the need for new directions in science. Because funding commitments to any one project are for only 3 to 5 years, this mechanism is flexible and responsive to rapid advancements in science, thereby allowing resources to be targeted at the most promising areas of scientific research in each grant cycle.

Sufficient funding over an adequate period of time is the best way to attract talented scientists from a variety of disciplines. The expanded competitive grants program will more adequately support researchers within the agricultural research system and will also open the system to scientists from other disciplines who have not previously participated in the USDA grants program. These scientists should be, but are not now, applying their skills to agricultural research.

An expanded competitive grants program will provide the needed balance among the funding mechanisms that support USDA R&D: intramural programs, formula funding, special grants, and competitive grants. Competitive grants are a significant source of funding within other federal agencies. At NIH and NSF, 83 and 90 percent of R&D support, respectively, is distributed through competitive research grants. At USDA, however, less than 6 percent of R&D support is so distributed. USDA should not attempt to mirror NIH and NSF in the proportion of funds it distributes on a competitive basis. Problems specific to certain crops, technologies, and regions are often best addressed through formula funds or special grants. Long-range research, such as the development of improved plant and animal germplasms, or tracking of the diets and nutritional status of a group of children as they grow, for example, are more effectively supported on a continuing basis through intramural funding. With full funding of this proposal, the annual investment in R&D by USDA would rise to $1.54 billion from $1.04 billion (Office of Management and Budget, 1989), and the $550 million in competitive grants would then account for approximately 35 percent of USDA's research expenditures.

FISCAL REALITIES

The recommendation for a major increase in funding of competitive research grants for agricultural, food, and environmental research comes at a time of overall fiscal constraint for the nation. Elected and public officials must reduce the national debt and at the same time set priorities among competing federal expenditures to enact programs that maintain the welfare, infrastructure, security, and continued economic growth of the United States. As a part of that they must also address public concerns for maintaining global competitiveness, the safety and nutritional quality of the food supply, and environmental resources. The goal of reducing expenditures while allocating funds for essential programs thus requires fiscal prudence.

Trade-Offs

Political leaders will need to consider the proposal for an increased commitment to agricultural, food, and environmental research against a background of potential trade-offs. What are these trade-offs?

- The additional $500 million could come from sacrificing other USDA research programs. Can some current research programs be discontinued in an effort to strengthen competitive grants research?
- The necessary funds could be directed to research from other USDA budget categories. Commodity price supports, for example, have decreased from $26 billion to $11 billion during the past 3 years, as U.S. agricultural export prices have improved. Should $500 million of those savings and future budgetary savings be redirected toward research, toward reducing the national debt, toward a combination of the two, or toward progress outside of agriculture?
- The funds could be shifted from other parts of the federal budget into USDA. Does the consistently high return on the agricultural research investment override the need for funds in other areas of national interest?
- The investment in agricultural, food, and environmental research can be deferred until deficit reduction has been achieved. But investing new funds now can hasten future economic and scientific benefits. What will be gained—or lost—by postponing the investment?

Redirection within the USDA Research Budget

For the past 25 years the USDA budget for research has not increased. Actual monetary increases have barely kept up with inflation. In 1965 the USDA

research budget had the purchasing power of $788 million in 1982 dollars; the 1988 research budget was valued at $778 million in 1982 dollars. In reality, any past changes in agricultural research priorities had to come from the redirection of funds within the research budget. Further redirection by increasing the investment in competitively awarded grants does not address the problem of the continued federal underinvestment in research through USDA. It also raises the real risk of destroying some of the "muscle" of current high-quality research in intramural and formula-funded research in attempts to cut out any "fat."

Without some real growth in the USDA research budget, there can be no realistic opportunity to broaden the scope of science contributing to agricultural, food, and environmental research. Many of the new scientific opportunities that require costly supplies and instrumentation will have to remain unexplored, and few multidisciplinary research teams will be able to be formed to attack the multifaceted problems of competitiveness, food quality, and natural resources confronting agriculture.

The proposed increase in funding for competitive research grants is justified. This proposal stands strongly against reallocation within the USDA research budget for the reasons given above. If no growth in the USDA research budget is possible, then decisions to redirect funds are judgments that elected and other public officials may choose to consider.

Reinvesting Subsidy Savings

As U.S. agriculture gradually returns to a state of economic health and as commodity prices return to free-market conditions, the federal budget appropriations currently used for price support programs may be targeted for budgetary savings. Part of these savings should be reinvested in research programs to strengthen the knowledge that supports the nation's food and fiber industries.

Federal Investment

Investments in agricultural research in the United States have consistently shown high returns, as noted previously. Such data demonstrate that an increased investment in the agricultural, food, and environmental research system will be paid back rapidly in economic development and other public benefits.

The U.S. gross national product in 1987 was $4.5 trillion (Council of Economic Advisers, 1989). Of that, the agribusiness complex contributed approximately 18 percent, or roughly $815 billion (Harrington et al., 1986). The current annual federal investment in agricultural R&D is about $1.04 billion—less than 0.13 percent of agriculture's annual contribution to the gross national product.

Investing Now

A major increase in research funding of $500 million is needed at this time. The scientific opportunities exist today to use this increased funding wisely. The needed scientific talent is available now, primarily through the nation's existing scientists in the physical, biological, engineering, and social sciences, as well as those in agriculture and related disciplines, who are ready to compete for this new funding. In addition, as noted above, increased funding will also ensure the flow of young scientists into agriculture-related research areas.

To achieve the maximum effect, this substantial increase should be enacted in a single year as a reflection of the value of the broadened scope of agricultural, food, and environmental research and the importance of the sustained advancement of this system to the U.S. economy.

Given the overall fiscal problems facing the nation, the appropriation of the full $500 million increase may not be possible in a single year. Even so, a commitment of this magnitude is essential. Any stepwise increase in funding should provide the full increase as soon as possible, preferably within 3 years, and be balanced to address the needs and opportunities in agriculture, food, and the environment.

CONCLUSION

Agriculture is the world's oldest and largest industry, and it has been a highly successful industry in the United States. The United States is endowed with perhaps the world's most extensive and abundant complement of soils, water, and climate favorable for agricultural production. Still, several other countries have tremendous natural assets to draw upon in developing productive agricultural industries. One dominant factor stands out in making possible the remarkable pace of development of agriculture in this country in contrast to that in other countries—the early and very strong support given to agriculture by the U.S. government. Agriculture was the first—and for a long

time, the major—federally supported scientific effort. It is significant that early federal support was not directed primarily toward infrastructure investments that yielded only quick benefits. Rather, support was broad, and a large proportion was directed toward research and education.

The decision to provide federal support for a strong U.S. agricultural system was made by the Congress 127 years ago through the Morrill Act of 1862. Now is the time to make a renewed investment in U.S. agriculture, one that will ensure its worldwide leadership role in the coming decades.

As a leader, the United States calls upon its agricultural and food system to compete in a free-market world. But U.S. farmers cannot compete with the price of labor in many countries, where it is far lower than that in the United States. And, for the same reason, they cannot compete with the cost of fertile land in other countries. The single resource that U.S. farmers can draw upon to capture the leading edge is science and technology. The U.S. government must help to provide an environment where U.S. producers and processors can compete. The most effective way to ensure a strong U.S. agricultural system is to capitalize on science and technology by investing strongly in agricultural, food, and environmental research.

(The complete report is held in the committee files.)

NASULGC National Association of State Universities and Land-Grant Colleges

TESTIMONY

Before

THE SUBCOMMITTEE ON DEPARTMENTAL OPERATIONS AND NUTRITION
of
The House Agriculture Committee

on

Current Agricultural Research and Education Priorities
NASULGC Board on Agriculture

Presented by

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March 25, 1993

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Statement by the NASULGC Board on Agriculture on Current Agricultural Research and Education Priorities

Mr. Chairman, my name is David G. Topel and I am pleased to provide this testimony on behalf of the National Association of State Universities and Land-Grant Colleges (NASULGC) Board on Agriculture. This Board is composed of representatives from Agricultural Experiment Stations, Cooperative Extension, Agricultural International Programs, Academic Programs, Council of Administrative Heads of Agriculture, 1890 Universities Research and Extension, Forestry, Home Economics, and Veterinary Medicine Boards from the Commission on Food, Environment and Renewable Resources.

The NASULGC Board on Agriculture is pleased to participate in the hearings on USDA priorities for research and education and offers its full cooperation and expertise to the process. The Board views the testimony process as an opportunity to strengthen and improve the Federal Government/University model of interaction and collaboration which has proven so successful over the past 130 years. It is a unique model and is envied worldwide, but it can and should be modernized to meet changing world conditions. The Secretary's call for a science based USDA emphasizes again the contributions of the Federal/University partnership in Science and Education which has promoted competitiveness, enhanced rural development and improved the safety and wholesomeness of the U.S. food supply. Therefore, the USDA should strengthen priorities for research and education.

As the USDA relates to future programs for Science and Education, priorities should be established to strengthen this unique state/federal partnership which:

- Links the USDA through 73 land-grant universities (including the 1890s and Tuskegee) to regional and state research bases of the Experiment Station System in 50 U.S. states and 6 territories. This system, which also includes the nation's forestry schools, colleges of veterinary medicine and home economics programs offers expertise and diversity second to none.

- Links the USDA through the Cooperative Extension System's educational outreach programs to producers and consumers in over 3000 counties throughout the U.S. and its territories. Past accomplishments of cooperative extension in rural development, human nutrition, and youth at risk make these educational programs particularly important in efforts to focus the USDA delivery system on the broad clientele of the Department.

- Connects within USDA and the land-grant universities those agencies of scientific inquiry and application whose collaborative efforts produce science based educational programs directed to real world problems.

- Results in the three-fold leveraging of the federal investment through state and local funding for research, extension and education.

The basic Science and Education functions of the USDA - Research, Extension and Education - merit close attention and priorities for each division should be coordinated by one agency for improved efficiency and a more effective delivery system. Some examples are listed:

- In the new world economy, competitive advantages for the United States will depend on maintenance and enhancement of our ability to generate and use science, technology, and education. Because of the long history of USDA in these areas, future priorities should build on these advantages;

- American agriculture must continue to lead the world in adoption of science and technology in order for the American public to enjoy continued benefits, and the American economy to prosper;

- A better trained and educated work force must occupy a high priority in rebuilding rural America;

- There must be an increased role for the USDA in undergraduate, graduate, non-formal and extension education to address the specialized needs of agriculture, natural resources, and family and consumer affairs;

- Increased interaction and collaboration between the Science and Education community and relevant USDA agencies such as Human Nutrition Information Service, Soil Conservation Service, ASCS, Farmers Home Administration, Forest Service, National Ag Library, Food and Nutrition Service and Food Safety and Inspection Service is essential for a more functional and effective department;

- Continued and enhanced collaboration with other federal agencies and departments outside USDA, such as EPA, Energy, Interior, HHS, Commerce, Labor, NSF and NIH is necessary if American Agriculture is to continue to capitalize on scientific advances across all areas of science in the interest of the general public.

In light of the above, and with particular attention to the opportunities and mandates emerging throughout government, the U.S. Department of Agriculture, as it relates to the Science and Education agencies and the land-grant university system, should take note of the following principles when establishing new priorities:

- Now more than ever, there is a need to retain flexibility for change and focus on enhancing the ability of the department to anticipate and respond to critical issues in a timely manner.

- Extension, research and education efforts of the USDA should emphasize rural development and revitalization as well as an environmentally sound and internationally competitive production agriculture. The USDA/Land-Grant University partnership must now respond to the greater and more complex issues of agriculture, environment and social/economic rural infrastructure.

- The research, extension and education areas of Science and Education have many commonalities, both in constituencies and in functional relationships, and provision must be made for strengthening the close working relationships among these functions, without hampering abilities to function independently when unique opportunities arise.

- Science and Education agencies should focus most closely on increased efficiency, while creating structural relationships that support collaborative activity. For Science and Education to support adequately the broad array of programs inherent in the U. S. Department of Agriculture, there must be sufficient administrative focus on the primary functions - research, extension and education - to allow full expression of their potential benefits, along with facilitation of work across organizational boundaries to assure the integration of science and technology into all departmental programs.

The NASULGC Board on Agriculture statement provides general or overall concepts for consideration. Representatives of the NASULGC Board will provide more specific recommendations for research, extension, instruction and international programs. Thank you for the opportunity to present a statement on behalf of the NASULGC Board on Agriculture on the priorities for research and education for the U. S. Department of Agriculture.

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April 30, 1993

The Honorable Charles W. Stenholm, Chair
Subcommittee on Department Operations & Nutrition
U. S. House of Representatives
Room 1301, Longworth House Office Building
Washington, D. C. 20515

Dear Congressman Stenholm:

On behalf of the NASULGC Board on Agriculture, I want to express a special thanks for the opportunity to testify before your subcommittee on Department Operations and Nutrition. The Board members obtained information from the leadership of the Land-Grant University System in developing the testimony. If you have additional questions or a need for further information, we would be pleased to cooperate.

Answers to the additional questions you requested are attached. The answers to the questions reflect my personal opinion based on my position as Dean of Agriculture at Iowa State University rather than Chair of the Board on Agriculture for NASULGC. Because NASULGC is a national association and governed by committees and boards, it is difficult to obtain a consensus when answering specific questions submitted by your committee. My answers to your questions are attached.

Members of the NASULGC Board on Agriculture look forward to your report on priorities and directions for the U.S. Department of Agriculture.

Sincerely yours,

David G. Topel
Dean and Director

DGT:ch
Enc.
cc: Dr. Mike Westendorf

ANSWERS TO THE QUESTIONS SUBMITTED BY CONGRESSMAN STENHOLM FOLLOWING TESTIMONY TO THE HOUSE AGRICULTURE SUBCOMMITTEE FOR DEPARTMENT OPERATIONS AND NUTRITION--PRIORITIES FOR USDA RESEARCH, EXTENSION, AND INSTRUCTION.

David G. Topel, Dean and Director
Iowa State University

1. One of the criticisms of both special grants and competitive grants is that a small number of institutions seem to garner large percentages of the funding. How do we better ensure that a small number of select states do not control the majority of the funding?

Approximately 1/3 of the land-grant universities dominate the dollars obtained through the USDA Competitive Grants Program. One alternative which would allow other scientists to obtain funds from the Competitive Grants Program would be to establish two or three additional divisions to the USDA Competitive Grants Programs. One division would include the existing program. Sixty percent of the competitive grant funds could be administered through the existing program. An additional 25% could be used for young scientists who have tremendous talent and ability, but have not had an opportunity to establish a research foundation where they would be competitive with scientists with established research programs. Another 15% of the allocation could be used for faculty members who have never received a grant from the USDA Competitive Grants Program. These funds would help develop research programs in universities that are not as competitive with the top 1/3 land-grant universities.

Special grants have receive much attention during the last 4-5 years. Anyone associated with the land-grant university system and the budget process for the federal government understands the importance of special grants to strengthen programs at the state level. Special grants have been used effectively for many years and it doesn't take a rocket scientists to project that special grants will continue to play a significant role in the funding process for many years to come. A close review of the utilization of special grant funds will reflect that the overwhelming majority of the grants have been used very effectively to build quality programs at the state level. A high proportion of the special grants result in programs that impact national and international activities. A large proportion of special grant requests are initiated by taxpayers at the grassroots level. The special grants provide an avenue for taxpayers to reflect their priorities through elected officials. Therefore, special programs can play a significant role in strengthening research, outreach, and instruction programs which have significant impacts on technology transfer resulting in a more competitive position for agricultural products around the world.

Because special grants complement other avenues of funding, it would be helpful to encourage multiple state cooperative programs for special grants. For example, there is a tremendous need for special grants in each region of our country. Special grants could be established which would allow individuals from 3 or 4 states to cooperate on projects supported by special grants. If facilities were needed to carry out the special grant activities, individuals from the cooperating states could compete for the special grant funds based on criteria established for the specific special grant. This process would allow special grants to be used effectively in different regions of the United States and would stimulate greater cooperation between individuals within a region.

2. Do you feel that current formula funding levels are adequate to support base levels of programming?

The USDA budget support for land-grant universities through the formula funding process has not kept pace with inflation or state support for land-grant universities over the last 25 years. It is very evident the federal government has not kept the same level of support for experiment station research programs when compared to state funding. There was a time in the history of the land-grant university system, that the federal and state governments provided equal funds based on formula funding concepts. In order to develop quality programs over the years, a high proportion of the states provided considerable more money than the federal government provided through the formula system. As a result, it is not uncommon for state governments to provide 3-5 times more support for agricultural research than the federal government provides through the formula funding method. I'm very concerned about the limited funds provided for agricultural research through the USDA budget process. The funds are so limited that many states have no reason to consider priorities established at the federal level for agricultural research. Therefore, the impact on priorities for research at the state level by USDA is limited when compared to priorities established 25 or 30 years ago. If this trend continues, USDA will have no impact on priorities for agricultural research in this country. The current formula funding method needs to be reviewed because it does not provide adequate support for base level funding from the USDA for research at the land-grant universities. The erosion of support for base funding at the land-grant universities over the last 25 years has had a significant negative impact on agriculture research at a large proportion of the land-grant universities. As a result, many of our land-grant universities are finding it difficult to compete for quality scientists and students. As a result, other countries around the world are developing a much stronger agriculture research base than the United States. This trend will have a serious and negative impact on producing quality food for the American consumer in the 21st Century if we do not correct this negative trend. I'm sure you know from your experience, the

most critical and fundamental aspect of a strong country is a stable and quality food supply. Strong support for base budgets at the land-grant university system is necessary to maintain a quality and stable food supply in the United States. It should be a national priority, not just an individual state priority.

3. Some individuals advocate a more regional approach to the distribution of formula funding. Are the present efforts made on these lines adequate or could they be increased?

I have major concerns about the utilization of funds through the current regional research programs. I believe we could make more effective use of regional research funds by eliminating the current administrative structure and transfer all of the dollars currently associated with regional research projects into a regional competitive grants program. The regional competitive grants program should require the cooperation of scientists from at least 2 or 3 states. The scientists would develop research projects that are truly regional in nature and address high priority topics for the region. After working on regional projects as a faculty member and administrator, I strongly believe that we can obtain stronger research programs by eliminating the current regional approach to research through the USDA-CSRS regional structure. It would be very easy to convert the existing regional research funds to a competitive grants fund. We would greatly reduce administrative costs and provide more dollars for research by converting existing regional funds to competitive research projects for the four regions of the United States.

4. Both the National Academy of Sciences and the Kellogg Foundation are undertaking studies of the Land-Grant System. What are some changes you feel should be made to prepare us for the 21st Century?

Outreach

The Land-Grant University System in the United States is the envy of most countries around the world. The current system has paid big dividends for dollars invested and has provided for an excellent way of life for the citizens of our country. It is time, however, to make significant changes in the land-grant university system in order to meet the needs of the citizens of our country as we prepare for the 21st Century. Agriculture has a great opportunity to make significant changes in the technology transfer area. This includes Extension. We have three distinct groups in agriculture which must be served through the technology transfer process of the land-grant university system. One-third of the users of technology developed at the land-grant university system request rapid transfer of the state of the art technology directly to their business.. We need a special division of the land-grant university system to address the rapid transfer of high technology to aggressive farmers, agribusiness industries and non-

agricultural companies which impact agriculture. We must develop technology transfer centers at each land-grant university which utilizes fiber-optic networks, computer networks, and satellite systems which will allow communication between farmers, agribusiness leaders, and scientists from throughout the world. This network must connect libraries around the world as an immediate research base for agricultural topics. The USDA Agricultural Library should be positioned to accept a major leadership role in the international library network. Faculty members associated with the technology transfer centers would work as one-on-one consultants with farmers and other agri-industries in the transfer of technology. The scientists and staff associated with the technology centers would be located at the land-grant university and would also have research or academic instruction responsibilities.

Approximately 2/3 of the farmers in the United States are not in a position to utilize the high technology methods for production agriculture. Therefore, these individuals need help on fundamental management principles, principles on balance sheets, leadership training, and fundamental short courses on methods to developed profitable systems in production agriculture. The foundation staff for this program should include cooperative efforts between the private sector and the public sector. Formal programs should be established between the private and public sector for providing technology and improved management systems to the individuals in production agriculture that are not in the position to utilize the high technology concepts and principles.

Research

Agriculture research at a large number of the land-grant universities must establish a much more basic and fundamental foundation as the system prepares for the 21st Century. One of the major short falls in the agricultural research program in the United States is the limited number of dollars available for fundamental research as it applies to production agriculture. In order to establish a more fundamental research program for agriculture, the land-grant universities should establish administrative structures which will stimulate faculty members in chemistry, physics, mathematics, political sciences, psychology, sociology, and other non-traditional agricultural fields to cooperate with faculty in the College of Agriculture and establish independent projects that have direct impact on agriculture. This is particularly important in the biological sciences, chemistry, biochemistry, physics, and math. In addition, large components of the engineering faculty can make significant contributions to basic research in agriculture. The USDA should restructure the land-grant university support system to encourage more fundamental and basic research for agriculture through interdisciplinary programs within the university and research centers from industry and the USDA. The best

incentive to stimulate interdisciplinary programs is through the budget process.

Curriculum

The Land-Grant University System and in particular colleges of agriculture must establish a new curriculum base for undergraduate and graduate students. An overwhelming number of land-grant universities still offer a very traditional curriculum for agricultural majors. Agricultural students should be required to obtain the basic principles of ethics, critical thinking, communication skills, writing across curriculum, international experiences including competency in at least one foreign language, international exchange programs, marketing principles at the national and international level, internship experiences at the national and international level, and business principles. These concepts must be incorporated into a curriculum which still allows for students to choose a production agriculture degree program. Administrators and faculty at the land-grant university system should aggressively change the traditional agricultural curriculum to attract quality students and better prepare the students for the challenges of the 21st Century.

5. As budget pressure brought on by the deficit increases, how might we change our allocation of formula funding, competitive grants and special grants to more effectively meet our needs?

Answers requested in Question 5 were addressed in the answers to the previous four questions.

6. As Dean and Administrator how do you include "crosscutting" initiatives in your planning process?

When I accepted the position as Dean of the College of Agriculture and Director of the Iowa Agriculture and Home Economics Experiment Station in 1988, the administration, faculty and students in the College of Agriculture had an opportunity to restructure our programs through a University Strategic Planning Process. We took this opportunity to establish a new foundation that utilized "crosscutting" initiatives which allowed the College of Agriculture and the Iowa Agriculture and Home Economics Experiment Station administration and faculty to reach out beyond traditional agriculture and incorporate fundamental programs in other colleges and departments into programs administered in the College of Agriculture. The attached administrative chart reflects the "crosscutting" programs. We established Centers of Excellence which allowed faculty members from departments within the College of Agriculture and departments in other colleges at Iowa State University to work together on topics of common interests. For example, the Utilization Center for Agricultural Products financially supports projects between

faculty members in the College of Agriculture, the College of Business, the College of Engineering, the College of Liberal Arts and Sciences, the College of Family and Consumer Sciences, and the College of Veterinary Medicine. We have similar Centers of Excellence in rural health, rural development, seed technology, international finance, food safety and sustainable agriculture.

The Centers of Excellence complement the department structure and allows for excellent "crosscutting" initiatives between faculty members throughout the University system. In the budget process, priorities are given to quality projects which include interdisciplinary research. Results of our "crosscutting" initiatives are described in our last two annual reports. I'm going to include this information as an example of our "crosscutting" initiatives developed in the College of Agriculture at Iowa State University.

The new administrative structure for the College of Agriculture also included jointly administered departments between two colleges. The departments of Economics, Biochemistry and Biophysics, Sociology, Statistics and Zoology-Genetics are jointly administered between the College of Agriculture and the College of Liberal Arts and Sciences. The department of Food Science and Human Nutrition is jointly administered between the College of Agriculture and the College of Family and Consumer Sciences and the department of Microbiology, Immunology and Preventive Medicine is jointly administered with the College of Veterinary Medicine and the Agriculture College

The jointly administered departments between colleges and Center of Excellence have worked well at Iowa State University to allow agriculture to reach beyond its traditional programs to help meet the needs of the agricultural industry as we prepare for the 21st Century. Agricultural colleges in the USA should reach beyond their traditional programs and form a new foundation.

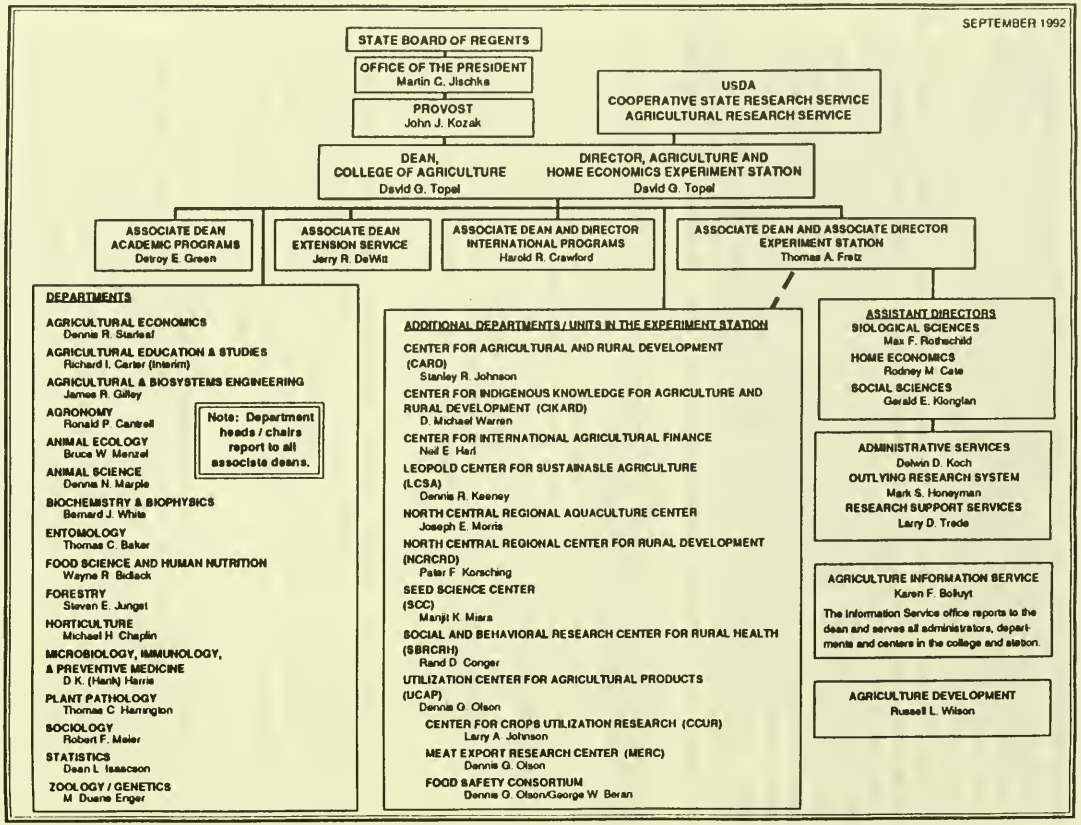
Each university and agricultural college will need to develop programs which best meet their needs as the same plan will not work for all universities in the Land-Grant System. The Kellogg Foundation and the National Academy of Sciences studies of the Land-Grant System could help the universities with their preparation for the 21st Century. It is important that these two studies are coordinated in close cooperation with the agricultural and university administration.

I've included very detailed information for Questions 6 because I feel strongly about "crosscutting" initiatives in establishing new foundations for agricultural research, instruction, and outreach programs for agriculture. The new structure for our programs in the College of Agriculture at Iowa State University has resulted in significant improvements for our funding base. We are on our fourth

year of improved funding from the Iowa Legislature for agriculture research. We established a plan to increase our base funding from the State of Iowa at a rate of 3 million dollars each year for 5 years. We have completed 4 years of the funding plan. The support from the State of Iowa to improve our base funding has resulted in a much more competitive research program. Funding from extramural funds has greatly increased since 1989. Currently, approximately half of the 60 million dollar agricultural research budget for Iowa State University College of Agriculture is from extramural funds. The taxpayers in Iowa strongly supported our new strategic plan to strengthen agricultural research at Iowa State University. The "crosscutting" principles to expand agricultural research beyond the traditional production agricultural programs was one of the major factors to obtain new base funding for agricultural research from the State of Iowa. I would strongly encourage the USDA, at the suggestion of your committee to establish similar concepts for strengthening agricultural research in the Land-Grant University System as well as the USDA-ARS research programs.

If you have further questions on the topics I addressed in the 6 questions you provided, I'd be pleased to visit with you.

(Attachment follows:)


SEPTEMBER 1992
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M. Duane Enger
Note: Department heads / chairs report to all associate deans.
ADDITIONAL DEPARTMENTS / UNITS IN THE EXPERIMENT STATION
CENTER FOR AGRICULTURAL AND RURAL DEVELOPMENT (CARD)
Stanley R. Johnson
CENTER FOR INDIGENOUS KNOWLEDGE FOR AGRICULTURE AND RURAL DEVELOPMENT (CIKARD)
D. Michael Warren
CENTER FOR INTERNATIONAL AGRICULTURAL FINANCE
Neil E. Harl
LEOPOLD CENTER FOR SUSTAINASLE AGRICULTURE (LCSA)
Dennis R. Keeney
NORTH CENTRAL REGIONAL AQUACULTURE CENTER
Joseph E. Morris
NORTH CENTRAL REGIONAL CENTER FOR RURAL DEVELOPMENT (NCRCRD)
Peter F. Korsching
SEED SCIENCE CENTER (SCC)
Manjit K. Misra
SOCIAL AND BEHAVIORAL RESEARCH CENTER FOR RURAL HEALTH (SBRCRH)
Rand D. Conger
UTILIZATION CENTER FOR AGRICULTURAL PRODUCTS (UCAP)
Dennis G. Olson
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Larry A. Johnson
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Mark S. Honeyman
RESEARCH SUPPORT SERVICES
Larry D. Trede
AGRICULTURE INFORMATION SERVICE
Karen F. Bolluyt
The Information Service office reports to the dean and serves all administrators, departments and centers in the college and station.
AGRICULTURE DEVELOPMENT
Russell L. Wilson

Research Centers

Iowa Agriculture and Home Economics Experiment Station

David G. Topel, Director
Thomas A. Fretz, Associate Director

Experiment Station research serves producers, agribusiness, communities and policy-makers. Its scientists work in campus laboratories, on land near Ames, at 11 research centers throughout Iowa, and in the fields and business places of private citizens. The station supports approximately 350 projects involving scientists from about 30 departments. It cooperates with the USDA and other state and federal agencies and is the administrative unit for the following research programs.

• Utilization Center for Agricultural Products (UCAP)
Dennis Olson, Director
Increased utilization of agricultural products through development of new products, new markets and new processing technology is the focus of the center. It strengthens and broadens programs in two existing ISU centers—the Meat Export Research Center and the Center for Crops Utilization Research.

• Center for Agricultural and Rural Development (CARD)
Stanley R. Johnson, Administrator
This center is involved in econometric analysis of the impact of biotechnology and technological change on the financial condition of the agricultural industry and the structure of agriculture. It also focuses on resources and conservation policy, rural and economic development policy, trade and agricultural policy, and food nutrition policy. The Midwest Agribusiness Trade Research and Information Center is affiliated with CARD. MATRIC, a joint effort of ISU and the Greater Des Moines Chamber of Commerce, links the research capabilities of the university with the needs of agribusiness.

• The Leopold Center for Sustainable Agriculture
Dennis Keeney, Director
Named for conservationist Aldo Leopold, this center was established by the Iowa Legislature in 1987 to conduct research on the environmental and socio-economic impacts of farming practices and to help develop profitable farming systems that preserve the productivity and quality of natural resources and the environment.

• Seed Science Center
Manjit Misra, Director
Programs at this center include research; seed testing; training seed specialists and seed scientists; and providing information for seed growers, conditioners and sellers

• Social and Behavioral Research Center for Rural Health
Rand Conger, Director
ISU and Iowa Methodist Health System created this center in 1988 in response to concern about the increasing amount and severity of rural health problems. The center's mission is to help improve the health of rural people through research programs and application of the insights that result. The center's research is focused on understanding rural health risks, reducing health risks in rural areas and fostering effective rural health policies and services. The center is associated with the Center for Agricultural Safety and Health, a joint effort between ISU and the University of Iowa.

• North Central Regional Center for Rural Development
Peter Korsching, Director
Serving 12 Midwestern states, the center is one of four regional centers coordinating rural development research and education through the land-grant institutions in the United States. The center assists public and private decision making by encouraging and conducting research, extension and educational programs designed to improve the social and economic well-being of non-metropolitan communities.

• North Central Regional Plant Introduction Station
Peter K. Bretting, Coordinator
One of four regional centers, the station maintains seed (germplasm) collections of 30,000 individual lines. The station has three basic areas of activity: (1) to grow and store seed to maintain viability of the collection, (2) to conduct research, and (3) to serve as a distribution center for plant scientists.

• Center for International Agricultural Finance
Neil E. Harl, Director
The center was established in 1990 to conduct schools and short courses in agricultural banking, credit and finance. Initially the center is focusing on countries in Eastern Europe and Eurasia.

• North Central Regional Aquaculture Center
Joeseph E. Morris, Associate Director
This center is administered jointly by Michigan State University and ISU. It is one of five regional centers established to develop collaborative interstate research and cooperative extension programs for commercial aquaculture—the culture or husbandry of aquatic organisms under controlled conditions.

ECOP
Extension Committee on Organization and Policy
National Association of State Universities and Land Grant Colleges
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FAX: 202/296.6456

TESTIMONY

Before

THE SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION

of

THE COMMITTEE ON AGRICULTURE, U.S. HOUSE OF REPRESENTATIVES

on

Science and Education Priorities at the U.S. Department of Agriculture

Presented by

Dr. Zerle Carpenter
Associate Deputy Chancellor for Agriculture and
Director, Texas Agricultural Extension Service
The Texas A&M University System
College Station, TX

Chair
The Extension Committee on Organization and Policy
National Association of State Universities and Land-Grant Colleges

March 25, 1993

Introduction

Mr. Chairman and members of the Subcommittee, my name is Zerle Carpenter. I am the Associate Deputy Chancellor for Agriculture and Director of the Cooperative Extension System in the State of Texas. I also have the privilege of serving as the current Chairman of the Extension Committee on Organization and Policy (ECOP) within the National Association of State Universities and Land-Grant Colleges (NASULGC). On behalf of ECOP, it is my great pleasure to take part in this hearing to discuss the role and functions of the Cooperative Extension System (CES) and the possible organizational strategies which might prove helpful to the Subcommittee as it seeks to improve efficiency and reduce costs in the operation of the Department of Agriculture. Mr. Chairman, I particularly want to commend you for your leadership and dedication in establishing a thoughtful and challenging examination of the "new vision" we seek for the U.S. Department of Agriculture.

Background

Mr. Chairman, the Cooperative Extension System links USDA to people and communities in almost every county of the U.S. (more than 3,000), through the land-grant universities in the 50 states, six territories, and the District of Columbia. Its mission is to help people improve their lives through a dynamic, multi-faceted educational program that focuses scientific knowledge on contemporary problems, issues and needs facing people, businesses, and communities. CES differs from a line agency; rather, it is a three-way partnership between the Extension Service-USDA and state and local units of government through the land-grant universities in each state. The partnership results in a three-way leveraging of the federal investment through state and local funding for research, extension and education.

Program Development

The Extension System's program priorities are identified with and for local people, who provide approximately 70 percent of the program's funding through state and county levels of government. The Extension System is the people's link with the total resources of the university and with federal research. At the same time, the federal component of this cooperative structure provides for a coordinated approach to meet national priorities.

Strategic planning is an ongoing activity in the CES. National leadership for strategic planning in the System is provided by the Strategic Planning Council (SPC). The SPC is the key group in synthesizing information about the future, the societal environment, and the capacities of the CES. The SPC identifies and assesses issues consistent with Extension's mission. It solicits and synthesizes information from futuring panels, external scanning processes and national advisory councils. At the State and county levels, similar structures and processes are in use to involve citizens, staff and relevant collaborators in strategic planning.

Historically, since the Smith-Lever Act of 1914, CES has served agricultural producers, families, communities, consumers and businesses. In recent years, the CES has served the priority needs of people in agricultural profitability and sustainability, water quality, youth at risk, consumer issues, human health and nutrition, waste management, and community economic development. To remain relevant and to meet the constantly changing needs of the people, CES must continue to work cooperatively with numerous other agencies and groups and is now also networked technologically so as to better draw upon appropriate research, disciplines, and databases.

Current Critical Issues Facing the System

Over the past five years, the CES has undergone a great deal of transition. Change has been the operative word throughout the CES. The focus of the change has been the move to issues-based programming. As a result of that change, some critical issues face the CES. Among those issues are the following:

- With increased intensity through the strategic planning process to identify the most time sensitive and critical societal issues, the CES has refocused some resources on issues affecting agriculture, children, families, environment, and consumers. The CES has gained significant praise from some for this action while being criticized by others for abandoning traditional clientele, especially production agriculture. In fact, the proportion of resources expended by the CES on agricultural and natural resource issues has increased. The most highly visible current programs of the CES focus on societal issues which relate to agriculture and consumers, such as food safety, water quality, and waste management. These are not seen by some as traditional agricultural production programs; however, these do address critical challenges facing agriculture production today.

- As the CES transition occurs, there is some lack of public understanding of the new agenda focusing on critical issues. This lack of understanding leads some members of the media, national organizations, and, in some cases, public officials to make statements which reflect the CES of the past instead of current program focus.

- As the CES continues the transition to issues programming, it is becoming increasingly apparent that the critical issues are very difficult to address in a non-formal educational setting. The educational program must be presented and received as non-advocacy. Staff of the CES need and will be receiving extensive training in both process skills and technology related to the critical issues.

- As the general economy of the U.S. has suffered, most State and local governments have had great difficulty with budgets. This has had a negative impact on the state extension systems and the land-grant universities in those states. For the most part, however, most have done an excellent job of responding to their fiscal situations.

- The CES has a long tradition of effectively educating many segments of society in programs related to agriculture, families, youth and communities. This outreach success is recognized by other segments of government with envy. The CES has an extensive infra-structure which can and should be used by other segments of government. Apparently, some have viewed the CES as a competitor to their ability to create a comparable outreach system. This is unfortunate and unnecessary. The CES stands ready to cooperate, collaborate or coordinate with other segments of government.

The Future

The CES continues to mature as a sound, proactive, nonformal, educational system dedicated to the improvement of the lives of people by addressing critical issues and needs. Change is accepted in the CES as condition of being part of the System. The CES continues to look to the future in hopes of continuing to be recognized as a positive force for change in the United States and internationally.

Principles for Restructuring

Extension's interest in the potential restructuring of USDA is based upon the need to effectively fulfill its educational mission with a broad-based program driven by people's needs. State structures for delivering CES programs vary widely and thus, any structure should focus on the agency's ability to maintain effective linkages to State programs.

Mr. Chairman, ECOP believes the following principles are important to consider in any structural reorganization of USDA:

1. Mission and function should be the primary criterion for reorganization. The USDA and its respective agencies are responsible for functional areas including Education, Research, Regulation, Conservation, Marketing, Economic Forecasting and Food Assistance.

2. For Extension to continue to be effective in its educational mission, it must be seen by clientele as a credible, unbiased organization providing science and knowledge-based solutions to critical problems.

3. Enhanced collaboration with other federal agencies and department is necessary for Extension to maintain a broad-based program focused on the highest priority needs and issues facing people.

4. There is a need to retain flexibility for CES to respond to critical issues in a timely manner (e.g., Africanized honeybees).

5. There is a critical need to retain the tremendous networked communication capacity that CES has built in the past several years. We are a part of the developing national information infrastructure needed to serve our customers, as well as cooperating and partnering with other organizations and agencies.

6. The USDA/Land-Grant University partnership is critical to food and fiber production, rural development, environmental protection, and other significant societal and economic issues affecting people in both rural and urban areas.

7. The research, extension and education functions have many commonalities, both in constituencies and in functional relationships. Structural relationships should support collaboration and cooperation among all relevant units, both within and outside the Department.

Restructuring Options

Mr. Chairman, at this time I would like to present the Subcommittee with three possible scenarios for the placement of ES in a restructuring of USDA. These are:

1) placement in a Subcabinet unit with regulatory and service agencies,
2) placement in a Subcabinet unit with research agencies, and
3) placement in a Subcabinet unit with other education and information agencies.

Allow me to briefly discuss the characteristics of each of these models which are briefly discussed below.

Placement of ES in a Subcabinent Unit with Regulatory and Service Agencies (e.g., FmHA, ASCS, SCS, FCIC)

It is our understanding that this structure is currently under consideration by USDA. It would provide:

- The potential for improved coordination between the educational role of Extension and the regulatory/service role of agencies that provide a direct service to selected users (agricultural producers).

- Potential for increased collaboration and coordination of programs and services at the local level.

- The potential to restrict the program to agriculture and reduce the current collaboration with other federal units (i.e., ARS, CSRS, FNS, HNIS).

- The strong potential for reduced state and local government and clientele support if they perceive their broader expectations, beyond farm programs, will not be met.

- Separation and the potential for reduced coordination between research and extension at the federal level.

- Potential perceptions of "regulation" as a role for ES, and thus the potential for negative perceptions of ES objectivity and credibility based on close association with regulatory agencies. At the state and local level, both funding and effectiveness could be jeopardized by this association with regulatory activities.

Placement of ES in a Subcabinent Unit with Other Science and Research Agencies (e.g., CSRS, ARS, ERS, NAL)

Mr. Chairman, this structure would provide:

- The potential for strong coordination between research and extension at the federal level recognizing the importance of science-based and user-driven research and extension education programs.

- A clear demonstration of ES and its related state extension systems as a science-based organization.

- Potential to enhance the transfer and application of relevant technology from the several research units within USDA.

- Potential reduction in program scope and loss of the strong state/local support base. If ES programs are defined only within the context of the current agricultural research agenda, it may limit responsiveness on contemporary issues such as community, economic, environmental and family needs.

- Potential of major reduction of outreach mission through suggested mergers with ARS and CSRS (e.g., H.R. 1122).

Placement of ES with Other Education Information and Outreach Units

Mr. Chairman, creating a new Subcabinet unit for Education and Outreach that would include Extension and other agencies/units with educational and information missions would designate ES as the primary educational unit of USDA. Other potential agencies and programs would include, for example, the education and outreach components of the National Agricultural Library, Higher Education, Agricultural Cooperative Service, Human Nutrition Information Service, Ag in the Classroom, and others.

Such a structure would provide:

- Consistency with a reorganization based on function.

- Potential to enhance cooperation among USDA agencies with educational responsibilities and increase efficiency among USDA outreach activities.

- A user-friendly source of information and education from throughout USDA (and other agencies) for clientele, including producers and consumers.

- Enhanced USDA capacity to lead and collaborate on outreach and education with other federal agencies that could benefit from using the CES delivery system (e.g., Commerce, Health and Social Services, Education, HUD, EPA, Interior, Labor, NSF, NIH, Energy).

- Separation from agricultural research entities (CSRS, ARS, ERS) at the federal level (similar to model 1, page 7).

- Enhanced access to research outside of USDA (universities, other federal agencies and laboratories, etc.).

- Enhanced ability to deliver a broad-based program responsive to national, state and local needs.

Summary

Mr. Chairman, it is important that the placement of ES in any federal structure be designed to recognize the federal, state and local partnership and the best interests of the people in every state, who support the broad-based program of Extension.

Regardless of the structure that evolves, the Cooperative Extension System will support the decisions of Congress and will cooperate in every way possible to enhance the Department and serve the people.

Mr. Chairman, on behalf of ECOP and the Cooperative Extension System, I once again thank you and the members of this Subcommittee for allowing me to testify today. We look forward to working with you and your staff on what we consider to be one of the most important issues this Subcommittee will address in the 103rd Congress.

(Attachments are held in the committee files.)

RESPONSE TO QUESTIONS

of

THE SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION

of

THE COMMITTEE ON AGRICULTURE, U. S. HOUSE OF REPRESENTATIVES

on

Science and Education Priorities at the U. S. Department of Agriculture

Dr. Zerle L. Carpenter

1. **How can we maintain the most efficient linkages between Extension and the Research community?**

The research community, including both its public and private sector components, is linked with Extension at several levels: national, multi-state, multi-county, and county. Within and across these levels, there is need for multiple linkages between Extension and research through (a) organizational/institutional leadership coordination and collaboration; (b) joint program planning and implementation to address specific issues; (c) split appointments, liaisons, and details across Extension and research agencies/organizations; and (d) effective communication networks via conferences, courses, and electronic and print media. Underlying the efficient linkage between Extension and the research community is the need for a common recognition of "mutual interdependence" in meeting public and user needs through promoting the generation and adoption of improved technologies and practices.

The major strategic planning effort occurs through the land-grant university where the state's Cooperative Extension System and the Agricultural Experiment Station are located. Dialogue occurs within academic departments, at field locations, and among users and commodity groups in the planning process.

It should be noted that the Cooperative Extension System, CSRS, and the Agricultural Experiment Stations are strengthening their joint planning activities by addressing priority research/Extension areas such as agriculture and the environment, as well as considering how to forge more efficient linkages.

At the national level, CES (ECOP) and ES-USDA jointly appoint and manage a Strategic Planning Council. The states Agricultural Experiment Stations (ESCOP) have representation on this planning committee. Likewise, ECOP is represented on the National Research Planning Agenda. In addition, ECOP and ESCOP have annual joint meetings to discuss major research and Extension issues, and regional CES and SAES directors meet, plan, and jointly sponsor study groups, task forces, and projects involving researchers and Extension specialists.

Also, local, state, and national communication systems are strengthening the many linkages. Extension and research professionals can communicate with each other via electronic mail, engage in cooperative work over electronic networks, jointly contribute to databases and decision support systems, and conduct research and Extension symposia using multi-media, including satellite.

2. **What percentage of your programs are production agriculture related?**

Forty-seven percent of the nationwide Cooperative Extension System's programs relate to agriculture and natural resources. This is three-and-a-half percentage points above where we were ten years ago and near an all-time high. Within the 47 percent, we have had some shifts toward more environmental issues such as water quality and issues that relate to management, marketing, and policy.

However, the manner in which one describes the "needs of production agriculture" has shifted substantially. For instance, what percent of the total CES effort in Food Safety education should be attributed to production agriculture? What about nutrition? It is quite possible that some of the "agriculture" oriented effort in the youth program or some of the rural community development efforts would be included by some of the production agriculture community. Obviously, this is a question creating considerable dialogue, but really defies a definitive answer. Therefore, one could propose that well over 50% of the budgets are expended on agricultural related programs.

3. **Describe programs which serve both rural and urban consumers.**

Extension's programs focused on addressing the needs of rural and urban consumers are aimed primarily at helping people make more informed decisions related to nutrition, diet and health, family and economic concerns, and the environment. Some current priority programs are described below.

Nutrition, Diet, Health, and Food Safety programs are aimed at helping consumers make choices related to nutritional intake to maintain a high quality of life, avoid debilitating diseases, and meet age and gender specific needs. The Expanded Food Nutrition Education Program also provides nutrition education specifically targeted to low-income families. Other programs focus on educating consumers about ways to meet the nutritional needs of their families in the most economical way. Extension also provides consumer education related to safe food purchasing and handling and preparing food to avoid encounters with serious effects of foodborne illness. Programs in health focus on the adoption of lifestyle practices which are necessary for maintaining healthy bodies and minds.

Family and Economic programs focus on helping consumers manage their income and assets in ways that meet their life-cycle goals. Programs are offered which emphasize saving, investment, and consumer expenditure strategies which make the best use of current individual and family income flows. Programs such as budget planning, mortgage refinancing, and loan consolidation are all examples of these efforts. Public policy issues are also covered. Issues such as changes in state and local tax laws, bond financing, and their implications for consumers are covered. Youth at Risk issues are addressed through that initiative.

Environmental Education programs relate to preservation of the environment with respect to clean water and air, effective solid waste disposal, and attractive environments. Programs in Urban Integrated Pest Management (IPM) are designed to assist consumers in managing pests in their homes, lawns, and gardens in a safe and economical manner.

4. **What makes the three-way partnership unique to Extension and how are Federal dollars leveraged by state and local dollars?**

Other cooperative agencies that form partnerships across governmental levels generally are confined to Federal/state partnerships or state/county partnerships. Cooperative

Extension is comprised of state, Federal, and local (county and city) staffs that cooperatively fund, plan, implement, and evaluate programs that develop practical applications of research knowledge and inform and educate clientele regarding these practical applications. This partnership currently leverages $426 million Federal dollars into an additional $1 billion from state and local sources. Federal funds have a fairly significant impact on the way many state and local funds are used. First, most Federal appropriations suggest priorities, and the amount of state and local funds going into such programs often far exceeds any match requirement.

It should also be understood that land-grant universities, county governments, and state governments also provide a substantial resource in the way of offices, laboratories, buildings, utilities, support personnel, equipment, etc. Yes, Federal funds leverage substantial resources directed towards national, state, and local priorities. In addition, it should be emphasized that less than 4% of the ES-USDA congressional appropriation is used by the small headquarters unit located in Washington, D. C. However, it is of paramount importance to retain this identifiable unit for purposes of coordination and for leadership on national issues of the Secretary and Congress. Without such national coordination and leadership, it would be extremely difficult to recognize a National Cooperative Extension System.

- The Cooperative Extension System (CES) is an education network centered in the nation's land-grant universities that provides research-based practical education applied to the complex problems of America's families, communities, agriculture, business, and industry.

- Established by Congress in 1914, the nationwide system operates as a unique partnership of the Federal government, the Nation's 72 land-grant colleges and universities (including 17 historically black institutions), and the more than 3,000 counties, with funding from Federal, state, and local governments.

- Cooperative Extension faculty and staff are professionals engaged in nonformal education programs that address social, economic, environmental, and technical concerns of the people. CES faculty and staff efforts are multiplied by the work of more than three million volunteers across the country.

- Extension educational priorities and initiatives are set by elected and appointed representative bodies at the local, state, and national levels. General areas of emphasis are established, with regular review as needs change. All three partners exert influence on programs and help determine priorities, with active involvement of the public, to meet their particular needs.

- Extension programs are carried out by each of the land-grant colleges and universities to respond to the needs of the people of the state; local staff develop educational programs appropriate to the unique problems of their areas.

- Extension field staff and specialists use a variety of educational methods—public presentations, demonstrations, publications, computer networks, satellite and video, newspapers, radio, and television—to reach their audience. Extension curricula and programs are enhanced through collaboration with public and private agencies and organizations.

As the name implies, Extension has a cooperative relationship among the three partners, as well as with 2.8 million volunteers in which the three partners "mutually agree" on the program to be carried out. No one partner dominates—that may be rather unique among Federal agencies.

5. **How much of Extension's work is rural development related?**

About seven percent of the total Cooperative Extension System FTEs are devoted specifically to rural development as indicated by states and counties through the national reporting system. These FTEs are focused mainly on the Extension Initiative, Communities in Economic Transition, providing education for: (1) community level strategic planning for economic development; and (2) enterprise development and business assistance. This effort is fully integrated with other program areas and is most often delivered through the same staff at the local level. The seven percent figure does not include the considerable Extension work that contributes to rural development through agriculture, natural resources, home economics, and youth programs.

The national Cooperative Extension System has collaborated with the National Association of Counties on joint projects related to rural community development. In addition, many programs and educational opportunities exist at the state and local level for elected officials and community leaders. Through this mechanism, CES multiplies many-fold what seems to be a low level of effort.

6. **How is Extension adapting to the communications age and how has the increase in technological communications enhanced the effectiveness of the Extension Service?**

Extension recognized the importance of the technological communications age nearly three years ago when it established the national Future Application of Communication Technology (FACT) committee. Today, the Cooperative Extension System is linked to its partners in research as well as many other organizations and agencies nationally and internationally. CES is well down the road in reinventing its technology systems and practices consistent with what will become the norm in the 21st century. CES is networked so that all staff can program cooperatively increasing quality and efficiency through computer and satellite technology. We may be the only nationwide, grassroots, decentralized, science based, computer and satellite networked organization in the United States.

In many places, we are also facilitating local cooperative ventures among higher education, K-12, community colleges, small businesses, and medical and health services that allow for cost-effective and efficient networking of local communities as well as new joint programming efforts. In areas such as Oregon, North Carolina, Indiana, New York, and Pennsylvania, Extension is working closely with mid-level networks as well as with statewide telecommunications networks and projects on the cutting edge.

The complete penetration of the internet throughout the land-grant system and the 70% complete penetration of the internet to county offices has greatly improved connectivity and timely data collection and delivery on a nationwide basis. The CES approach is based on open systems, use of internationally accepted standards, and collaborative work through networking. ES works very closely with the National Science Foundation and is coordinating all efforts with the Federal Networking Council. Information management decisionmaking today is far easier given that the global internet is the infrastructure for communicating not only with state and local entities, but many other countries as well.

A concrete example of the tremendous capacity of this system was Extension's ability to respond from county level to a request for possible youth service projects in less than 24 hours. Extension Service-USDA received some 1,000 responses—800 by electronic mail and 200 by FAX in that time period, regarding more than 3,000 possible youth service projects.

Through the AG*SAT Corporation consortium of 43 land-grant institutions, Extension Service-USDA, and the Cooperative State Research Service, we have the capacity to deliver interactive, issue-based education at a distance. We are increasingly sharing not simply our infrastructure but our quality programmatic expertise in multi-media with other organizations and agencies. Recent examples include cooperative work with the National Association of Counties (NACo) to conduct interactive, nationwide videoconferences on "Aging Population and Aging Infrastructure" and "Watershed '93" produced cooperatively with other USDA agencies and the U.S. Environmental Protection Agency, U.S. Geological Survey, National Oceanic and Atmospheric Administration, National Park Service, and the National Water Research Institute. More than 25 interesting and innovative projects have been financed through the AG Telecommunications project, and Extension is currently cooperating closely with REA to implement the Distance Learning and Medical Link program.

We are excited about our increasing ability to connect, communicate, and manage in a dynamic and collaborative, rather than static, sense. Extension can gain access to nearly any database that is open in USDA, the land-grant community, other countries, and other government agencies virtually instantaneously. Software has been developed that enables end users to access and retrieve electronic documents via electronic mail. Developed by one of our land-grant partners, this software (ALMANAC) is being deployed throughout Extension, USDA, and other agencies and organizations. NSF is exploring it as an addition to its growing software infrastructure.

The Cooperative Extension System believes that total quality management, decentralized and participative management systems, a customer focus, and a real understanding of how government can be reinvented by combining these concepts with cutting edge technology will define successful 21st century organizations. We are already well down the road to establishing the necessary infrastructure and changing mind-sets and practices to serve today's citizens as well or better than ever before.

7. **Describe how "crosscutting" initiatives with other agencies are included in your planning and programming process?**

The Cooperative Extension System routinely involves other agencies and organizations from both the public and private sectors in planning and programming. For example, Extension's national initiative on health education is being planned and launched in collaboration with national, state, and local public health agencies; Federal and state HHS offices of rural health policy; National Institute for Occupational Safety and Health; Easter Seals; medical schools; the W. K. Kellogg Foundation; and numerous others. The nature of the partnerships with other agencies and organizations varies widely and includes joint sponsorship, funding, development of programs models, educating staff in other agencies and organizations, participation on community advisory councils, and interorganizational referrals.

One example is our work with the National Association of County Officials on watershed management. In addition, ES is producing a national videoconference on the new food labeling with FDA and FSIS. Also, we are currently working with, demonstrating, and educating other government agencies and departments (education, USAID, NOA, EPA, GAO, and others) on how information technology and distance education methods can be used to serve a much larger segment of society in a much more site-specific manner.

A close and continuous planning process occurs within the land-grant university system—both within and outside of agriculture. Through this process, the expertise and talent of the Total University Community can be made available to the "people." At the state level, Extension is linked with many other public institutions and agencies. It should also be recognized that the Extension network is actively sought for collaboration and cooperation by many public and private organizations.

Experiment Station Committee on Organization and Policy

Experiment Station Section
The Division of Agriculture
National Association of State University and Land-Grant Colleges

ESCOP

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TESTIMONY

Before

THE SUBCOMMITTEE ON DEPARTMENTAL OPERATIONS AND NUTRITION
of
The House Agriculture Committee

on

Improving Functional Relationships in The USDA
for
The State Agricultural Experiment Stations

Presented by

Dr. James R. Fischer
Director, South Carolina Agricultural Experiment Station
Clemson University

Chair
The Experiment Station Committee on Organization and Policy

March 25, 1993

Improving Functional Relationships in The USDA
for
The State Agricultural Experiment Stations

INTRODUCTION:

Mr. Chairman, my name is James R. Fischer and I am pleased to provide this testimony on behalf of the Experiment Station Committee on Organization and Policy (ESCOP). This committee represents the State Agricultural Experiment Stations (SAESs) which are located at each Land Grant University in the United States.

One of the most exciting parts of USDA Science and Education is the state-federal partnership in agricultural research which links the Cooperative State Research Service (CSRS) with a national network of State Agricultural Experiment Stations. This linkage has been and continues to be a major factor in the success of U.S. agriculture.

The commitment of the new Administration to the use of science and technology to facilitate economic growth and environmental enhancement is exemplified in the document accompanying President Clinton's address to the joint session of Congress on February 17, 1993 (A Vision of Change for America). In this document, the programs of Science and Education in the USDA were sustained and, in some cases, expanded to address new agendas.

The new Administration finds itself at a major cross-roads for U.S. agriculture. Agriculture involves a much broader agenda today than before. There is growing recognition that USDA and SAES clientele include every citizen of the U.S., not just farmers. New problems are coupled with continuing needs for new knowledge and technology. Modern science offers unparalleled opportunity to meet these challenges. New needs have generated much greater expectations for the delivery of new technology.

The major new and continuing issues include food safety and nutrition, environmentally sound and economically viable systems of sustainable agricultural production, methods to develop alternative uses of agricultural products and enhanced economic viability for farm families and rural communities. The new Administration calls for fresh approaches in addressing these problems, including appropriate reorganization of the USDA.

Reorganization of the USDA offers an opportunity to improve the functional relationships between the State Agricultural Experiment Stations and the Department. It is an opportunity to build on and expand relationships that have historically served the state-federal partnership very well. The recommendations in this paper are derived from a four-part analysis: (1) assessment of the USDA goals for reorganization, (2) definition of attributes of the present system which meet these goals (and therefore should be continued),

(3) identification of functional areas where change will improve performance of the SAES-USDA partnership and, (4) considerations for redirection or reorganization.

USDA GOALS:

The overall stated goals of reorganization of the Department are: (a) streamlining and making the Department more efficient and "farmer friendly", (2) conserving fiscal resources, and (3) reassessment of strategies and priorities to address changing needs. It is assumed that the Congress and the Administration seek common goals and that changes in legislation are possible, if needed.

In our analysis of these goals, as they pertain to the SAESs, we developed a set of derivative goals or targets for the Science and Education community that will enhance the function of USDA and the SAES system:

- Assure science based management of USDA programs
- Provide improved ability to define strategic issues and from this to define directions and priorities with resource allocation to address these priorities
- Improve the communication of research results to improve use and assure accountability
- Improve the ability to respond to national needs at the local level both with respect to primary responsibilities of USDA and agriculture related issues in other parts of government
- Effective linkage with other parts of the federal science establishment to enhance cooperation and coordination of related research
- Based on a clear national strategy, improve decentralized decision making and empowerment at the lowest possible functional level

ATTRIBUTES OF THE PRESENT SAES SYSTEM:

President Clinton, in his address to Congress on February 17, 1993, used the Land Grant Universities as an example of the kind of re-investment in the future that his Administration intends to make. While the system continues to evolve, and is far from perfect, the following existing attributes seem to address the goals of the reorganization and, therefore, should be continued and preserved:

- An existing national network involving all states and six U.S. territories with grass-roots linkages and sophisticated broadly based university faculty having commitment to address the problems of U.S. agriculture

- Early recognition and remediation of new problems and opportunities at the grass roots level

- Relationship with the Cooperative Extension System, providing an unequaled mechanism for education and technology transfer for all parts of U.S. agriculture

- Linkage with the higher education programs in land grant universities, drawing on the energy and imagination of graduate and post-graduate students and contributing to the provision of a cutting edge education of the next generations of practitioners and scientists in agriculture

- A demonstrated track record of development and use of new knowledge and technology that has been a major factor in the success of U.S. agriculture

- At least a three-fold leveraging of USDA funds with state and other funds

- An existing effective and functional strategic planning process that builds from the grass roots and identifies and prioritizes the national research agenda and results in redirection of existing and application of new resources to changing needs

STRATEGIC PLANNING, PRIORITY SETTING, AND RESPONSE TO CHANGING NEEDS:

The State Agricultural Experiment Stations and the Cooperative State Research Service have made functional use of national level strategic planning since 1984 as a means of developing budget proposals and redirecting resources. The Experiment Station Committee on Organization and Policy, which represents the SAESs at the national level, along with its Federal partner, develop a major revision of their strategic research plan every four years. In intervening years, the plan is revised and updated as necessary to meet changing needs and to provide input to the USDA Joint Council on Food and Agricultural Sciences. Each year, it is sent to every Experiment Station Director to rank the initiatives in priority order of importance, based on perceptions of need and opportunity.

The product of ESCOP-CSRS planning is a broadly stated document that provides vision and mission statements for the SAESs, a brief background for perspective and an array of highest priority initiatives, with research objectives and resources needed to achieve the goals. It includes a state and regional consensus on relative priorities based on a very broad input from the users of the product of SAES research.

ESCOP participates in the development and advocacy of the budget proposal for the Board on Agriculture of the National Association of State Universities and Land Grant Colleges (NASULGC). ESCOP uses the Strategic Research Plan as the principle guideline in developing recommendations for the annual budget recommendation, maintaining close communication at the early stages of development with CSRS. NASULGC makes a

proposal to the USDA for the Science and Education budget in the summer before appropriations are made. ESCOP, along with other NASULGC counterparts evaluate the President's budget in early spring and then take their recommendations to the Congress.

The SAESs are not tightly organized as is the case with federal agencies conducting research and development. They represent a coordinated network of participating state agencies which are part of land grant universities. Their strength lies in the distributed decision making and programs of research that address the needs and opportunities of individual states. They support a diversified set of agricultural and related industries which are based on the specific natural resources and other factors that also make U.S. agriculture site specific. Despite the distributed nature of this network, it has a consistent ability to find consensus on the major national issues of over-arching importance that require programs of research to provide new knowledge and solutions. There is a growing need and opportunity to share resources and trade-off responsibilities in four regions of the country into which the SAES community is divided.

The ESCOP-CSRS Strategic Research Plan has been and is successful in recognizing both the continuing and new needs for research on food, agriculture, natural resources and the environment. In the past, the system has redirected the existing portfolio of research projects to meet changing national and local needs. The federal government has provided sustaining support for the on-going programs as well as selected new funding in high priority areas. In the present environment, this system is challenged to continue to use the basic procedures now in place for effective planning, but to shift its budgeting strategies towards a reinvestment of existing resources rather than an investment of new resources added to current appropriations. While this has been done in practice at the state level for many years, the system has less experience with seeking and maintaining consensus at the national level in the "net sums" situation (see also appendix one).

OPPORTUNITIES FOR FUNCTIONAL CHANGE:

- Take a USDA leadership role in expanding farm programs that reward environmental stewardship rather than production of surpluses. A science- based approach to achieving this, through enlightened research, will maintain the option of farming with voluntary rather than regulatory management of the environmental agenda, while continuing to enhance international economic competitiveness.

- Develop incentives and support for regional activities that can effectively consolidate or complement state level research and development. Use of geographic information system methods will provide a means of assessing common natural resource bases for regional research at the level of basins, watersheds and other natural resource boundaries. Such methods will also enhance the effectiveness of priority setting

- Improve the linkage between various research and education programs which address common critical issues. Establish a clearer vision of the contribution of "discovery" level research (as exemplified in the National Research Initiative), applied research and information delivery on common critical issues and assure better linkages at the interface of these programs

- Expand and improve linkages with other federal science agencies to improve the efficiency of the use of USDA resources through cooperation and coordination. Assure more meaningful commitments for interaction and support

- Several specific functional changes would contribute to these more general goals:

    - Expand research on total farming systems to address the needs for sustainable agriculture interests and general farming programs

    - Develop mechanisms to more effectively identify and address emerging and urgent priorities using a "research contract" mechanism to purchase focused effort on short term crisis needs

    - Develop a closer relationship in strategic planning between the elements of Science and Education

OPTIONS FOR IMPROVED ORGANIZATION:

This analysis has focused on functions that should be established or enhanced to meet the goals of the proposed reorganization of the USDA. We suggest that the reorganization be considered using modern management principles, which enable decentralized decision making based on national strategies. These principles include the use of flexible management structures that facilitate linkages and communication between organizations that perform and those that use the results of research and development. There is also a growing need to more effectively link parts of the system that perform related or complementary functions. The overarching principle is to develop the functional mandate for administrators and scientists to communicate and collaborate within whatever organizational framework that emerges.

This broad networking of related functions might best be administered using a matrix management approach. Such an approach would facilitate:

- Effective linkages between the Science and Education agencies and the action agencies of the USDA

- Effective linkages to related parts of the overall federal science establishment

- Coordination of programs and collaborative activities within and between departments

- A separate management focus for the interrelated Science and Education agencies

- Mobilization of fiscal and other resources to implement strategic decisions

With respect to the partnership between the SAESs and the Cooperative State Research Service (CSRS), there are several changes that would expedite achieving the new vision and goals of the USDA:

- Expand the role of CSRS in facilitating interaction between the SAESs and:
  - other parts of the USDA (especially the action agencies)
  - other "users" of the results of agricultural research and development in the federal system
  - other parts of the federal science establishment

- Redirect CSRS resources to take on a larger role in facilitating engagements, while reducing the effort on disciplinary reviews; place more emphasis on interdisciplinary reviews that assess progress in achieving goals on high priority topical issues

- Reduce or eliminate pork barrel funding of research and facilities while continuing peer reviewed special grants of national importance, including special grants for "contract research"

- Develop a competitive peer reviewed mechanism for selection of facilities to be partially supported with federal funding

- Decentralize review and approval of regional research to the level of regional associations of SAESs. Create a greater dynamic in the use of regional research funds to address priority issues. Make more use of regional research funds as seed money to develop multi-state collaboration for external funding

- Continue to expand the use of senior faculty and administrators from universities for program management in CSRS, with a shift towards the NSF program director role.

- Improve the ability to provide a timely documentation of accomplishments that will provide a clearer picture of accountability for the use of federal funds in agricultural research and development. Improve the Current Research Information System (CRIS) to provide science and management information on problem and issue based subject matter. Make CRIS interactive with all parts of the USDA science and education activity.

(Attachments follow:)

SUMMARY OF RELATIONS BETWEEN GOALS, ATTRIBUTES, CHANGE & ORGANIZATION

USDA GOALS	ATTRIBUTES	CHANGE	REDIRECTION
Science Based USDA Management Improved communication on outcomes, better accountability	Existing SAES network with science based missions oriented research	Better linkage with action agencies of USDA and other federal agencies with agriculture related responsibility	Improved reporting of accomplishments for communication and accountability
Define Strategic issues, establish priorities improve efficiency and direct resources	Existing effective strategic planning--grass roots to national level	More effective coupling of resource allocation to priorities Improve linkages between research and education programs--discovery level to application	Reduce/eliminate pork barrel projects and facilities Competitive peer review system for facilities
Improve responsiveness to national needs at local level	Early recognition and remediation of new problems and opportunities Demonstrated track record of development and use of new knowledge	Regional activities that replace, consolidate or complement state level research and development Linkage with higher education including graduate students	Technology development to assure "farmer friendly" results Expand CSRS role in facilitating interactions of SAESs with action agencies and other users
Linkage and cooperation with other parts of the federal science establishment	Linkage to Cooperative Extension for education and technology transfer	Improve linkages with other federal science agencies to improve efficiency of use of USDA resources	Matrix management organization with flexible linkages of science and education
National strategy with decentralized decision making	SAES network, with state, regional and national priority setting		

STRATEGIC PLANNING, PRIORITY SETTING AND RESPONSE TO CHANGING NEEDS:

The State Agricultural Experiment Stations(SAESs) and the Cooperative State Research Service (CSRS) have made functional use of national level strategic planning since 1984 as a means of developing budget proposals and redirecting resources. The Experiment Station Committee on Organization and Policy (ESCOP), which represents the SAESs at the national level, along with its Federal partner, develop a major revision of their strategic research plan every four years. In intervening years, the plan is revised and updated as necessary to meet changing needs and to provide input to the USDA Joint Council on Food and Agricultural Sciences.

The plan is based on state and regional input from the SAESs as well as advice from a wide array of users of the product of research in the system. This includes national organizations representing all segments of agriculture and agribusiness and environmental and consumer groups, among others. Input is also sought from the professional and scientific societies representing agricultural and related scientists at the national level. A series of annual "customer conferences" is conducted to augment written input to the planning process. In these conferences, elected representatives and executives of various national organizations offer advice on needs and opportunities for research. In addition, input is developed from a national conference held every four years in Washington on agricultural research policy, where decision makers provide broad strategic guidance. Developing the ESCOP-CSRS plan involves active participation by all parts of the USDA Science and Education community. Representatives of these agencies attend the drafting workshop and contribute directly to the genesis of the document. Members of the faculty of CSRS are directly involved in generating the document. The ESCOP Planning Committee initiates action on the four-year update about two years before its publication. It becomes very active in developing the revision for a year in advance of its publication.

The revision of the document actually occurs in a major workshop that involves both

administrators and senior scientists representing the broad array of scientific and programmatic interests and responsibilities of the SAES-CSRS complex. About one-hundred participants divide themselves into subcommittees that address the six major components of the plan. They consider the several hundred specific inputs from the users of the research product and develop a set of broad initiatives which define the highest priority needs for new information and technology. They also define for each initiative a set of research objectives that are needed to achieve the prescribed goals. There is also an assessment of the resources required to fully implement the recommendations for each research objective.

After the draft has been given tentative endorsement by ESCOP and CSRS, the initiatives are sent to every Experiment Station Director who is asked to rank the initiatives in priority order of importance, based on perceptions of need and opportunity. This grass roots evaluation of priorities is repeated on an annual basis. There is an excellent consensus among regions on the most important five or so initiatives out of a set of 15-20 items. Likewise, there is good agreement on the initiatives of lower (but important) priority. The mid-range of average priorities has less regional consensus, reflecting the diversity and site specificity of much of what is done in agricultural research.

The product of ESCOP-CSRS planning is a broadly stated document that provides vision and mission statements for the SAESs, a brief background for perspective and an array of highest priority initiatives, with research objectives and resources needed to achieve the goals. It includes a state and regional consensus on relative priorities based on a very broad input from the users of the product of SAES research.

The ESCOP-CSRS plan is one of the inputs to the National Agricultural Research Committee (NARC), which is part of the Joint Council on Food and Agricultural Sciences. This Council, mandated by the 1977 and succeeding Farm Bills, also receives input from similar committees dealing with Extension, Higher Education and International Programs. The NARC has membership from the SAESs , Federal agencies conducting agricultural and

forestry research, non-land grant universities involved in agricultural research, the Colleges of Forestry, Veterinary Medicine and Home Economics and the research directors of the 1890 universities. The NARC provides to the Joint Council annual rank-ordered recommendations for research priorities, a semi-annual input for the update of the Joint Council's strategic plan and annual reports on research accomplishments. The Joint Council meets at least annually with the Users Advisory Board, also mandated by the Farm Bill. As the name implies, this Board is comprised of representatives of the user community who also make recommendations on the budget for science and education to both the Secretary and the Congress. The product of the Joint Council is presented to the Secretary of Agriculture and, in practice, has been a significant input to the budget development process for Science and Education in USDA.

ESCOP participates in the development and advocacy of the budget proposal for the Board on Agriculture of the National Association of State Universities and Land Grant Colleges (NASULGC). ESCOP uses the strategic research plan as the principle guideline in developing recommendations for the annual budget recommendation, maintaining close communication at the early stages of development with CSRS. NASULGC makes a proposal to the USDA for the Science and Education budget in the summer before appropriations are made. ESCOP, along with other NASULGC counterparts evaluate the President's budget in early spring and then take their recommendations to the Congress.

The SAESs are not tightly organized as is the case with federal agencies conducting research and development. They represent a coordinated network of participating state agencies which are part of land grant universities. Their strength lies in the distributed decision making and programs of research that address the needs and opportunities of individual states. They support a diversified set of agricultural and related industries which are based on the specific natural resources and other factors that also make U.S. agriculture site specific. Despite the distributed nature of this network, it has a consistent ability to find consensus on the major national issues of over-arching importance that require programs of research to provide new knowledge and solutions. There is a growing need and

opportunity to share resources and trade-off responsibilities in four regions of the country into which the SAES community is divided.

The ESCOP-CSRS strategic plan has been and is successful in recognizing both the continuing and new needs for research on food, agriculture, natural resources and the environment. In the past, the system has redirected the existing portfolio of research projects to meet changing national and local needs. The federal government has provided sustaining support for the on-going programs as well as selected new funding in high priority areas. In the present environment, this system is challenged to continue to use the basic procedures now in place for effective planning, but to shift its budgeting strategies towards a reinvestment of existing resources rather than an investment of new resources added to current appropriations. While this has been done in practice at the state level for many years, the system has less experience with seeking and maintaining consensus at the national level in the "net sums" situation.

RESEARCH CONTRACTS, A CONCEPT FOR FUNDING URGENT NEEDS

The State Agricultural Experiment Stations are immediately responsive to emergency or short term urgent needs that arise within states. They are closely coupled to policy and decision makers and to clientele from which such needs arise. Often, needs that emerge at the national level have their first recognition and response at the state level. SAESs often have already begun to respond before federal agencies recognize and act.

Despite this early awareness and responsiveness that comes from grass roots involvement, the SAESs lack a mechanism at the national level that allows the Administration and Congress to provide highly directed resources to deal with short term emergency needs. This proposal recognizes that the Cooperative State Research Service has an established funding mechanism which could also be employed to meet this need. CSRS Special Grants are targeted to specific purposes of recognized national importance and usually involve relatively applied research.

In this approach, a category of special grants would be established for one-time contracts for highly specific products of research. There would be specifications written for the product, along with a prescribed delivery schedule. The contracts would usually be of relatively short duration, one to two years. The type of research done would vary with the need, but there would be a clearly conceived and achievable product delivered at the end of the contract. While the topic for the research contract would be highly specific, it would deal with national needs and would be awarded competitively. Often research contracts would be awarded to individual institutions, but there may be occasions when consortia of institutions (sometimes including non-agricultural or industrial members) would be more appropriate to assure timely response.

Identifying the topics of research contracts would often not occur prior to the normal appropriations process. Thus, it would be ideal if an appropriation could be established for

this purpose which does not state the precise use, but allows for identification of contract topics during the budget year. The Congress could be involved in oversight of this program, if desired, to assure that its intent is maintained.

Research contracts would not replace, but augment the award of research grants by CSRS and other parts of the federal system. In contrast to this program, grants draw on the creativity of the scientist(s) who make the proposal and provide more flexibility in exploring avenues of greatest promise as results become available.

(Additional attachments are held in the committee files.)

RESPONSE FROM DR. JAMES FISCHER

Questions Resulting from Hearing
on
Agricultural Research and Education Priorities

Subcommittee on Department Operations and Nutrition
House Agriculture Committee

March 25, 1993

1. How much accountability is there for spending of formula funds?

Formula funds are appropriated to individual state agricultural experiment stations by distributing the total appropriation to states on the basis of a formula that is related to the size of agriculture and number of farms in the state.

Each project proposed for support by formula funds undergoes a merit review, peers within the parent institution or externally. Each proposed project is reviewed and approved by the individual SAES and CSRS, assuring and attesting to the national scope and relevance as well as the quality of the project. Most often, there is joint funding of the project with state and federal appropriations.

Each project approved for federal formula funding is evaluated on an annual basis through submission by the project scientist of a progress report to the SAES and USDA/CSRS. This report also becomes a part of the Current Research Information System (CRIS), making it available to other scientists across the country. At the completion of projects, a final report is also submitted to USDA/CSRS for review, evaluation and storage in the CRIS.

Individual projects are usually approved for a period of three to five years. Projects which are proposed for renewal are reviewed at the SAES for progress towards achieving established goals. Such projects are also subject to renewing review by the USDA/CSRS. Periodically, external institutional reviews at either the department or program level are conducted under the aegis of USDA/CSRS to evaluate broader aspects of the formula fund investment.

In summary, accountability for spending of formula funds is based on initial merit review, ongoing evaluation at the state and federal level, and review for accomplishments on completion. Institutional reviews are done at about five year intervals to assess and advise SAES directors on the status of departments or programs on a broader basis.

2. What criteria are used for the evaluation of research effectiveness?

SAES projects or grants have explicit statements of goals and objectives. Most projects are established for durations of three to five years. Annual reviews are conducted at both the state and federal level (see above). Review and evaluation of progress is made annually by the Department Head or Chair, by the office of the Experiment Station Director/Research Director and by responsible faculty in the CSRS.

Criteria used for evaluation of research effectiveness include:

- o Extent to which time-phased goals and objectives proposed for the project are achieved.
- o Demonstrable products of research including publications, patents, germplasm releases, demonstrated adoption by users.
- o Performance of individual faculty and staff is usually evaluated on an annual basis, where accomplishments on funded projects is a critical factor.
- o Effectiveness of the research performed by faculty and staff are also critically reviewed when they are considered for promotion, tenure, and merit salary adjustments.
- o Research effectiveness is also evaluated by professional peers in judging the merits of publications and in local, regional or national recognition in professional and scientific societies.
- o In some cases, research effectiveness can be estimated in terms of economic impact, in other cases, the results are judged on the basis of environmental impact. Results may also be estimated in terms of consumer benefits.
- o Various user publics often provide evaluation and feedback on projects addressing their immediate interests.
- o Many SAES directors and department and branch station heads also have advisory committee inputs and other user-based evaluation exercises.

3. How can we make more effective linkages between ARS and CSRS as well as the service agencies at USDA (FSIS. APHIS, SCS, etc)?

ARS scientists often participate in SAES regional projects, and SCS and Extension personnel often participate as collaborators.

Presently, ARS scientists participate in the developing the ESCOP-CSRS Strategic Plan. This involves their active participation in the debate and documentation at the first stage of development. The ARS Strategic Plan is evaluated in draft form by the SAESs before publication. The National Agricultural Research Committee of the Joint Council is a forum for developing consensus on annual research priorities which are used by the Joint Council in developing its strategic plan and its annual priorities. Regional Councils of the Joint Council, which look at regional priorities, include participation by ARS and SAESs. Recently, ARS, CSRS and the SAESs initiated an engagement to determine how we can more effectively collaborate using existing resources on research dealing with food science and safety. Lead agency responsibilities for joint areas of research are established between ARS and CSRS (plant and animal genome research, i.e.) ARS has a more active engagement with the service agencies of USDA to determine research priorities and to report results than does CSRS.

The following are actions which would improve the linkage between ARS and CSRS:

- More effective linkages between ARS and CSRS could be accomplished by an earlier involvement of the SAES-CSRS community in the development of the ARS Strategic Plan.

- There could be established greater expectations for coordination of annual budget requests between CSRS and ARS. This would require strong leadership at the level of the Assistant Secretary for Science and Education and explicit statements of expectations of the agency heads.

- There is opportunity to improve the linkage between on-going research programs in ARS and the SAES through enhanced communication at the local level.

- The deliberations of the NARC and Regional Councils should be continued with restoration of funding for the engagement (which was reduced FY 1993).

- Congress could appropriate funds to programs which would be required to be planned and executed as collaborative efforts.

Actions to improve the linkage between SAESs and service agencies of the USDA include:

- CSRS should take a more active role in brokering the relationship between the SAESs and the action agencies of both USDA and other federal agencies whose programs impact agriculture.

- SAES scientists should be used as advisors in developing the goals, objectives and scope of cross cutting issues that involve multiple agencies in USDA.

- SAES and CSRS representatives should be active participants in research-user workshops now conducted between ARS and the action agencies of the department.

- Contract research (our proposal for a new funding mechanism under Special Grants) could be funded with the mandate for action (service) agency that will use the product to develop an active role in defining and monitoring the contract.

4. In developing your strategic plan, how much involvement is given to producer, consumer and environmental groups? How much to Congress?

Stakeholders play a very active role in defining the needs and opportunities addressed in the ESCOP-CSRS Strategic Plan. Beginning at the local and state levels, input of users of research products is actively sought and plays a pivotal role in defining the programs of research in the SAESs. Regional research planning is emerging as a method of facilitating cooperation and collaboration and will seek input from regional legislative groups, industries and other users.

At the national level, input is sought for the ESCOP-CSRS Strategic Research Plan from more than three hundred organizations that are users of the products of SAES research. In addition, there are annual "Customer Conferences" that bring together related users of research products to advise ESCOP on research needs. Commodity and farm organizations, professional and scientific societies, environmental groups, and consumer organizations are actively involved in the planning process.

At the national level, the engagement with traditional commodity and farm organizations is longer standing and more developed than with environmental and consumer groups. But, major emphasis is being placed on strengthening linkages with all user groups to define research needs. The User's Advisory Board is specifically mandated by the Congress as one mechanism of developing input for SAES (and other) USDA research.

The Congress has a pivotal impact on the research agenda through the authorizing and appropriations process. The authorizing committees of the House and Senate provide the broad goals and objectives and the statement of purpose for what we do. Very often, specific instructions relative to expenditure of funds for clearly identified purposes are a part of the Congressional language on CSRS appropriations. In practice, there is an ongoing dialogue with members and staff of both the authorizing and appropriations committees in both the House and Senate.

In developing the strategic plan, we have routinely invited members of Congress in leadership positions to address our National Policy Symposia that are held in Washington in conjunction with the quadrennial planning cycle. This more formal engagement with the planning process is symbolic of the much more frequent informal engagement that is ongoing with Congressional leadership. We would obviously welcome the opportunity for

more frequent and effective engagement and would hope that these hearings will serve as one of the stimuli to promote such communication.

With the Congressional Fellows, we are attempting to develop a seminar series for Congressional staff on topics of mutual interest.

5. **How do we correctly balance basic and applied research? Does the current mix contain relatively too much basic research or relatively too much applied or mission linked research?**

Although often used, the terms "basic and applied" create artificial images of the orientation and application of research. There is a continuum of research that involves fundamental study leading to breakthroughs or discovery of new principles or concepts at one end of the spectrum and, at the other end, the necessary research to apply these principles to actual operation. The latter is often site specific. By institutional definition, all SAES research is targeted to an ultimate application. A very large amount of the total research investment portfolio lies in the middle ground between the two ends of the spectrum. Formula funds vs competitive grants is not synonymous with applied vs basic; neither is short term vs long term related to the application of results.

The National Academy of Sciences/National Research Council report "Investing in Research, A Proposal to Strengthen the Agricultural, Food, and Environmental System" (1989) concluded that there was an underinvestment in agricultural research, especially in the employment of the new research methods of modern biology and engineering (biotechnology). This has been accepted by both the previous and new Administrations. Its recommendations have been incorporated by the Congress in the 1990 Farm Bill.

There have not been quantitative studies of the distribution of research across the spectrum from discovery to application for all types of funding in the SAESs. There is not even a consensus on how projects would be categorized across this spectrum. However, it is the perspective of most students of this subject that a large percentage of the aggregate investment at the state level is still directed towards the applied end of the spectrum. A subjective estimate of the current distribution is that about 25% is oriented to the discovery end of the spectrum, 25% to site specific application and 50% to the center of the spectrum, combining fundamental and applied methods.

The segment of users representing interest in sustainable agriculture often seek a greater investment of research resources at the application end of the spectrum, since they perceive the short term need to be there. However, this group readily identifies with the need to address needs for fundamental knowledge (at the discovery end of the spectrum) that is required to enhance the performance of sustainable agriculture. They are especially keen on the need for more long-term total systems research to develop management models for

sustainable agriculture as it applies to farms, farm families, rural communities, and broad landscapes.

There is a perception among some that, in the aggregate, the scientific programs of the SAESs have shifted from applied toward more basic research. This may be due in part to the increasing use of the modern tools of biology and engineering for agricultural research which involves a shift from field to laboratory studies. But, the interval between fundamental discovery and application in the "new biology" is often very short.

There is a concern that Land Grant Universities have become broad based academic institutions with a system of rewards that favors "single investigator fundamental research". The balance may have shifted at some institutions in this respect. There are problems in recognizing contributions of research and extension scientists at the application end of the spectrum. The studies of Land Grant Universities planned by the Kellogg Foundation and the National Academy of Sciences will explore the influence of the faculty reward system on the effectiveness of agriculture programs. Methods of recognizing and rewarding interdisciplinary research (often of relatively long duration) will be one of the key issues in this matter. The problem is not that too much fundamental research is being done, but that there needs to be a more equitable recognition of contributions at the other end of the spectrum.

In summary, the balance between basic and applied research is not so much the issue as is the orientation of research to meet broadly expanding mandates from the food, agriculture and environmental needs . The opportunity to exploit the modern tools of biology, engineering and social sciences calls for a greater investment in the programs defined by the National Research Initiative. However, this new investment cannot come at the expense of the federal investment in base programs which undergird the remainder of the portfolio which is also necessary to the health of the SAES system and U.S. agriculture.

6. What are the main purposes of "base programs"? How has an erosion of formula funding affected these programs?

Base programs are usually equated with programs partially funded with federal formula funds. These include Hatch, Cooperative Forestry, Evans Allen, and Animal Health funds. As previously noted, these funds are awarded on a formula driven by the size of agriculture and number of farms in a given state. Base programs also are funded with state appropriations. They are generally regarded as recurring, stable, long-term sources of revenue for the SAESs. They often provide the opportunity for assuring continuity in funding of long-term research.

Research projects funded with formula funds are submitted to merit review (usually be either an internal or external peer process) and are reviewed and certified by USDA as being national in scope. Most projects of this type are also supported (often to a major

proportion) by state appropriations. In the case of Hatch funds, 25% of the total fund must be spend on regional collaborative research. States are required to provide a one-for-one match of formula funds.

The main purpose of formula funds awarded to the SAESs is to provide a mechanism for decentralized implementation of national strategies. Historically, the concept recognizes the substantial site specificity of agriculture and thus the research programs which support these industries. It assumes that decision making on project funding at the state level provides optimum focus and assured relevance of the efforts.

Projects funded with a combination of state and federal formula funds are often the first to respond to emerging problems or opportunities as they are recognized at the state level. For instance, there was a major redirection of effort to address the emergency related to the impact of the sweet potato white fly on cotton and horticultural crops by the affected states well before the USDA organized a formal national campaign.

Shared long-term state-federal commitments which are enabled by the appropriation of formula funds make the CSRS-SAES relationship unique among federal granting agencies and universities. Long-term fiscal relationships enable and justify long-term planning and program collaboration between the SAESs and USDA. The federal government leverages its research investment in formula funds by at least three-to-one with state appropriations. This type of arrangement forms a natural basis for effective partnering and is totally consistent with the concepts enunciated in "Reinventing Government" relative to empowerment at the lowest level, user involvement and total quality management.

Over the decade of the eighties and into the nineties, there has been a consistent small increase in formula funding which has not always kept pace with inflation. Thus, over this period the "science power" of this kind of funding has been reduced. Thus, the slope of the constant dollar line for formula funds trends downward slightly over time. This is exacerbated in some SAESs by broader institutional decisions to maintain competitiveness by increasing salaries of faculty, even when new funds were not available. Most institutions have offset this erosion by more aggressively seeking and acquiring grant funds both within USDA and elsewhere. There is some concern that "chasing grant money" detracts, at least to some extent, from the ability of faculty and administrators to maintain focus on the most pressing issues and priorities.

Periodically, the appropriateness of formula funding is questioned because (1) the federal government does not have the same ability to direct these resources to specific application as is possible with competitive or special grants and (2) there is the incorrect perception by some that the quality of research cannot be assured since projects are not subjected to the same rigor of merit review as in other programs.

Absent the ability to direct formula funds to specific application before award, the USDA relies on initial review of proposals and evaluation of accomplishments resulting from this research to judge relevance and accountability. Such reviews, which are conducted on an ongoing basis, and which involve oversight by other parts of government from time to time, consistently show a very high return on this investment. Moreover, as indicated above, there is often a currency and relevancy of application of these funds that is based in early recognition and intervention which occurs at the grass roots level on unforeseen problems and opportunities. Formula funds may, in part, be directed to long-term research goals. But, individual projects are subjected to annual review and renewal on a three-to five-year cycle.

The mandate to use 25% of Hatch funds for regional research has been the continuing motivation for strong regional associations of state agricultural experiment station directors and for promoting meaningful collaboration and cooperation among SAESs. As with other projects funded with Hatch money, there is at least a three-to-one leveraging of federal funding with state appropriations. And, the process of establishing, reviewing, approving and evaluating regional research projects is even more rigorous than with other projects. This provides a strong assurance regional and of national relevancy.

As part of the quadrennial revision of the ESCOP-CSRS, the CSRS is developing a major assessment of the dynamics of base programs over a ten year period. This should be a milestone document for evaluation of the relevance and accountability of formula funding.

From this description, one would logically conclude that formula funds are an excellent federal investment with a demonstrated track record. And it would seem obvious that individual SAES directors would prefer the maximum flexibility in investment decisions no matter what the source of funds. With the serious erosion of research capacity that has occurred in the last two to three years from loss of state appropriations, it would seem likely that SAES directors would be particularly interested in maintaining and expanding formula funds. We believe all these assertions to be true. Why then is there an apparent reluctance for the system to place its major emphasis on securing and expanding this type of federal support?

As testimony from other panelists has suggested, formula funds have been regarded by several preceding administrations (especially at policy levels broader than agriculture) and by Appropriations Committee staff and members as an entitlement; an open ended appropriation for which it is difficult to assure either relevance or accountability. Arguments to the contrary and analysis of the return on investment from these funds have been sufficiently persuasive to sustain them over the years. But, the more general concern has kept formula funds from achieving more than modest (less than inflation) growth in the decade of the 90s.

On the other hand, competitively awarded special grants and the NRI are perceived by most policy and decision makers as offering a greater ability to focus and provide a structure against which accountability can more readily be measured.

In the real world, our experience over the last ten years or more has been that a more achievable approach to initially acquiring and subsequently maintaining future increases in funding is to be as specific as possible regarding the purposes to which such increases will be applied. Thus, the advocates of formula funds have set the more limited goal of seeking support to maintain their purchasing power through increases which offset inflation, but to seek other mechanisms to secure major real growth in total funding.

7. **Do Special Research and Facilities Grants result in an erosion of base funding? What would the Agriculture Research System look like if there were no "pork" ?**

Up to this point, there has certainly been some concept of a total available package of appropriations for agricultural research. But, we believe that the "fixed pot" concept will be more of a factor in the overall future strategy in the current Congress and under the new administration.

There is ample information to show the deterioration of agricultural research facilities in Land Grant universities. There is no mechanism other than special facilities grants for the federal government to pay their share of the modernization and expansion of these resources. The result is that the Congress has provided funds through this mechanism. Because of its accessibility, the special grants mechanism has been used to fund non-agricultural projects on occasion. There is not a mechanism in place to assure that facilities grants are awarded on the basis of national priorities or that they support the programs most likely to impact national priorities. Facilities grants are usually initiated to fund planning or design studies, creating an implication of future funding that has resulted in a bow-wave of almost $500 million of future funding, if all projects initiated were funded at the level requested for the federal share. **There is clearly a need for a new mechanism to provide federal funds for facilities used in agricultural research..**

Special Research Grants are a vitally important part of the national agricultural research portfolio. They provide a mechanism for focusing on national priorities. This is recognized in the Administration's budget proposal, where a large part of the present portfolio is recommended for continuation. There are other special grants that are national in scope and targeted to priority areas that are not included in the President's Budget Proposal. Most of these grants are competitively awarded on the basis of merit and relevance. We have suggested an increase in special grant funding for "contract research" to deal with short term emergency issues.

In answering other questions, we have pointed out that there are special grants that are awarded without competition to address site specific needs. Where this occurs, effort is made to assure quality and relevance.

Site specific special grants provide research to address recognized needs. However, if we were assessing the merit and value of the elements of the overall federal agricultural research portfolio based on a national strategy, these types of grants would not rate as high in priority as other parts of the portfolio. If shifts in funding are needed to address new high priority national needs, these grants would seem to be the most likely candidates for review. **Not all site-specific grants are poor investments of federal funds. Their continuation or eliminations should, in our view, be based on merit and relevance.**

From the previous answer, one would be led to conclude that the amount of money that the Administration will recommend and that Congress will appropriate for formula driven programs is finite. Most of our community doubt that any more funds could have been secured for these programs. Thus we believe that the gains that have been made in the NRI and in special grants have not been at the expense of formula funds. Without these alternative mechanisms of funding, we believe the total funds would not have grown. There has never been a reduction in base programs during the existence of the NRI; in all but one year, there have been modest increases. We believe that there should be substantial caution in presenting the comparison of formula vs other funds as a comparison of the percentage of total funds unless actual funding levels are also provided.

Up to this point, we have not been aware of an explicit trade-out between facilities and programs, although this must certainly be a factor in broad terms that is dealt with by the Appropriations Committees.

8. **How can we properly balance formula funding, competitive grants and special grants?**

There would seem to be three implicit components to this question: (1) what is the present distribution, (2) what is the optimum distribution (as a function of total funding) and (3) how can we generate the proper balance? In our strategic planning, we look at issues first and methods of funding as a second level of planning. Often addressing a critical national issue involves funding from several sources and mechanisms.

Present Distribution:

There are unfortunate semantics problems in the use of the basic-applied descriptors--the terms mean different things to different communities both within and outside of the research community. We believe that applied and mission linked are roughly synonymous, although our perception of the NRI faculty's interpretation is that the mission linked end of the NRI spectrum is more basic than what is more commonly defined as applied research.

By institutional imperative, all SAES research is targeted; there is no "science for science's sake" effort that can be sustained under our state mandate. We should not confuse basic and applied with competitive vs formula funded research. There is a very substantial investment in fundamental research in the base programs, and some of the competitively awarded grants are applied.

There is a perception among some of a shift in emphasis of overall program that results from a continuing growth in sophistication of the tools of research that are used for problem solving or applied efforts. Modern methods of biological and physical research address applied problems with what were previously regarded as tools of basic research.

While Congress is primarily concerned with the federal funds which it appropriates, the optimum investment strategy in the SAES-USDA partnership should consider the total investment, not just federal funds. CSRS funds for agricultural research in FY 93, exclusive of facilities, totals about $434 million, of which some 51% are formula funds, the NRI accounts for about 22%, special facilities grants provide 12% and the remainder is for other smaller efforts and administration.

The total funding for agricultural research in the System is almost two billion dollars, of which the federal component is about one-third, the CSRS part is less than a quarter. State appropriations provide about $1.1 billion dollars (55%) for agricultural research. Another $249 million is derived from other sources, including about 7% derived from industry.

In our testimony, we stated that we are not aware of a quantitative assessment of how the total funding for agricultural research is distributed. Recognizing the semantics hang-up with using the terms basic and applied, the opinion was expressed that at one end of the spectrum, about 25% of the total resources are directed at breakthrough or discovery research. At the other end of the spectrum, we estimated that about 25% of the effort was directed at very specific application of existing knowledge and technology to site-specific effort. We believe the remainder of the investment is a very healthy mixture of development and application of new knowledge and technology.

Optimum Distribution of Formula, Competititve and Special Grants

There is probably not a well developed consensus among SAES directors on this question. The differences in opinion arise from the differences in resources available to individual SAESs and the external competitiveness of such institutions. We accept the charge from this Committee that such a consensus should be sought.

The NAS/NRC study, referred to in our testimony, concluded that there is an underinvestment in research at the discovery or breakthrough end of the spectrum. While this study advocated new funding for that purpose, it also called for a major part of the new investment to be in multi or interdisciplinary research, recognizing that team efforts will be

needed for problem solving. They also recommended that mission-linked research be incorporated into the program to assure effective technology transfer.

Getting at the question of optimum distribution requires establishing a frame of reference for the question. For instance, if we were threatened with serious cut-backs in federal funding for agricultural research, most SAES directors believe that the System and the agricultural industries we support would be best served by protecting formula funds.

We believe that the best opportunity for growth in the total program lies with increasing funding for the NRI and selected special grants of national importance. This is especially true with the endorsement of the new Administration for this program. As mentioned in the answer to a previous question, we have a recurring experience at both the state and federal level that makes us believe that the best method to acquire new money and to sustain its re-appropriation over time, is to establish a clear, well-focused relationship of new resources to recognized national issues of highest priority.

Our community believes that the special grants which are awarded competitively for efforts which address national priorities are effective and provide useful focus on contemporary issues. Our community recognizes the prerogative of members of Congress to seek support for their constituencies. When this occurs, every effort is made to assure both quality and productivity of such efforts through merit review and evaluation. As discussed elsewhere, many believe increased use of contraact research should be made to provide a means for the university community to help addressees the short-term critical needs of the food, agriculture, and environmental communities.

In summary, there is not a simple answer to the question of the optimum distribution of funds. It is clear that the SAESs have a much broader mission, an expanded clientele and a greater set of expectations for service than ever before. Also, there has been a very substantial erosion of state funding for the SAESs resulting from the current economic situation in the country. We are clearly under pressure to do more with less. At the level of many individual SAEs, both functional and institutional restructuring to meet this new call are already underway.

In the constraints of the present environment, our first goal would be to achieve modest growth of funding for our most important programs, looking on them as an investment which creates economic activity, rather than a drain on taxpayers. We are pleased that the first communication from President Clinton indicates strong support for the use of science and technology to maintain and stimulate economic recovery and growth. In his statement "A Vision of Change for America", the President establishes a growth position for agricultural research. We believe the SAESs, as part of a larger land grant university philosophy and commitment, are ideally suited to develop and deliver the targeted products of research that will support this national goal.

How Can We Generate The Proper Balance:

This Subcommittee, along with the full House Agriculture Committee, have authorized substantial growth of formula funds over the 1990-1994 time frame. There has also been authorization of a number of special grants and other programs, including those for sustainable agriculture that address needs and concerns of farmers and ranchers, environmentalists, and consumers. The Congress has authorized a growth of the National Research Initiative up to $500 million per year by the end of 1994.

We do not know how the Congress will position itself with reauthorization of these funds in the 1995 Farm Bill. We would hope that the concept of an investment with demonstrated payoff would make funding for agricultural research sufficiently attractive that it will be sustained and enhanced in the new farm bill.

We recognize there is a move on the part of senior members of the Congress to develop a closer relationship between the authorization, budget, and appropriations processes, both in terms of substance and function. We assume the more general decisions that emerge from this debate will drive the results of deliberations on agricultural science and education.

In our testimony, we suggested that Congress and the Administration could facilitate stronger collaborative activities for the SAESs at the regional level which could consolidate or complement state level research and development. The SAESs are strongly motivated to cooperate because of shortage of funds and pressures from governing bodies to assume greater responsibilities with shrinking resources. There are current examples of how such programs work including the Integrated Pest Management Program, Aquaculture Program, National Pesticide Impact Assessment Program and Sustainable Agriculture Research and Education Program. There might be other targeted special grant programs for regional research. Regional Centers of Excellence (without walls) could be considered.

As we contemplate the staggering financial pressures that exist today on almost every land grant university, it seems most likely that these institutions will continue to seek relief anywhere it can be found. Thus, while those concerned with the total picture at the national level might wish it otherwise, the most likely scenario is that individual institutions will continue to seek help from the Congress in securing funding for projects or facilities that benefit their institutions and states, even if some projects are not of the highest national priority.

Congress and the Administration could establish alternative mechanisms for providing this kind of support and establish and use ground rules that would make this process more orderly and constrained. If such ground rules were in place and understood, we believe the land grant university community would respect them. To illustrate this concept, we proposed in our testimony that the concept of a competitive facilities grant program be revived and restudied.

9. Describe briefly the grassroots planning of research priorities.

This question was answered in detail in the supplemental testimony submitted for the record at the time of our oral presentation. It is included as Attachment 1.

This statement shows that inputs at the county, state and national level are sought on a continuing basis in planning and evaluating research priorities and in the advocacy of resources identified with the needs and objectives. The process is not perfect, but the involvement is growing. Because of the great regionality (site specificity) of the industries we serve, translating grass-roots input into national strategy is challenging but achievable, based on our experience.

10. How are you including "cross-cutting " programs such as basic plant and animal science research and environmental science research in your strategic plan?

Implicit in this question is the assumption that the disciplinary mix of science to accomplish research objectives is embedded across the six major areas of the ESCOP-CSRS Strategic Plan and in the seventeen initiatives grouped under these areas. This is the case. In addition, the resources segment of the plan identifies the science years and cost of implementing each research objective. We are in the process of more explicitly defining the kind of science mix needed to achieve the goals of our plan.

The ESCOP Planning Subcommittee recognized a need to develop what we came to call the "Science Dimension" to our joint plan with CSRS about a year ago. The purpose is to provide a means of more effectively communicating with the broad science community within our land grant universities and to display our current and future programs in a context that will be understood by federal funding agencies outside USDA.

We are in the process of translating the "outcome oriented" elements of our present planning process into terms describing the science required to achieve the stated goals. The descriptors for the science dimension are those used by the National Science Foundation in their reporting of federally funded grants and contracts.

We anticipate developing this document as part of the quadrennial update of the ESCOP-CSRS plan, which is being developed at this time. We believe this will offer a better possibility to communicate in another dimension both in the academic community and with federal granting agencies.

11. Describe contract granting research which you mentioned in your testimony.

The State Agricultural Experiment Stations are immediately responsive to emergency or short term urgent needs that arise within states. They are closely coupled to policy and

decision makers and to clientele from which such needs arise. Often, needs that emerge at the national level have their first recognition and response at the state level. SAESs often have already begun to respond before federal agencies recognize and act.

Despite this early awareness and responsiveness that comes from grass roots involvement, the SAESs lack a mechanism at the national level that allows the Administration and Congress to provide highly directed resources to deal with short term emergency needs. This proposal recognizes that the Cooperative State Research Service has an established funding mechanism which could also be employed to meet this need. CSRS Special Grants are targeted to specific purposes of recognized national importance and usually involve relatively applied research.

In this approach, a category of special grants would be established for one-time contracts for highly specific products of research. Specifications would be written for the product, along with a prescribed delivery schedule. The contracts would usually be of relatively short duration, one to two years. The type of research done would vary with the need, but there would be a clearly conceived and achievable product delivered at the end of the contract. While the topic for the research contract would be highly specific, it would deal with national needs and would be awarded competitively. Often research contracts would be awarded to individual institutions, but there may be occasions when consortia of institutions (sometimes including non-agricultural or industrial members) would be more appropriate to assure timely response.

Identifying the topics of research contracts would often not occur prior to the normal appropriations process. Thus, it would be ideal if an appropriation could be established for this purpose which does not state the precise use, but allows for identification of contract topics during the budget year. The Congress could be involved in oversight of this program, if desired, to assure that its intent is maintained.

Research contracts would not replace, but augment the award of research grants by CSRS and other parts of the federal system. In contrast to the contract approach, grants normally draw on the creativity of the scientist(s) who make the proposal and provide more flexibility in exploring avenues of greatest promise as results become available.

12. Describe what you mean by science-based management.

In his early comments on organization and operation of the USDA, Secretary Espy used this term. It was following his early experience with the outbreak of E. coli food poisoning in the Northwest. The use of modern surveillance and screening tools was an obvious part of the action needed to reduce the likelihood of such occurrences.

In our translation of his very brief statement, we infer that Mr. Espy intends to move towards assuring that all programs of the action agencies in the department will be

increasingly driven by sound strategic planning and decision making based on solid use of information and technology derived from modern science and technology development.

While we believe that the USDA already uses this type of enlightened decision making, we saw in the new Secretary's early agenda setting an indication of new emphasis and an opportunity to effectively communicate our belief that the science and education community is in a position to be a very positive contributor to a management strategy that uses science based information and technology.

13. How much research is funded either through check-off dollars or industry? Do you feel this is a viable alternative for the future and how can we avoid the appearance of conflict of interest?

According to CSRS estimates, about $134 million of the $1.981 billion for agricultural research in FY 1991 was derived from industry. This is about seven percent of the total. Of these industry funds, it is estimated that about $40-45 million is derived from check-off funds.

Check-off funds, managed by producer boards, are usually preferentially directed to market development as opposed to research. Research grants are almost always awarded for very short term, one-time studies that have a highly predictable outcome and product. This is a necessary condition to securing the continuation of the check-off commitment by participants. These funds are almost always leveraged with public funds, frequently to a very large degree. From the perspective of scientists performing research, check-off funds often provide badly needed operating funds for existing areas of research, especially in today's situation where an increasingly large percent of public funds are spent for salaries.

In our opinion, the growth of check-off funds expended for research will be finite. This would not seem to be a source of funding that could grow from the present small portion of the total resource to a point where it would significantly offset public funding. Such funds, spent in a partnering mode, have another kind of utility, however. This is in increased "ownership" and support of public programs by industry which comes from their shared investment.

In addition to check-off funds, industry provides other kinds of funding to support agricultural research. Larger companies engage the SAESs at both the fundamental and the application ends of the research spectrum.

There is increased partnering between SAESs and industry on discovery level research in biotechnology; the kind of research that produces new products such as diagnostics and vaccines. Here, successful technology transfer must be measured by fielding a product, and this requires an industrial partner in almost all cases.

Industry also engages the SAESs in site-specific evaluation of new products (often chemical products). Perhaps here, more than in any other part of our industrial relationship, we are accused of being in the position of having a potential conflict of interest. We are asked to accept funding from a manufacturer to evaluate the efficacy of a product produced by that company. Environmentalists and consumers frequently express concern about this relationship. It is one which requires and is receiving increased attention at the institutional level.

In summary, we are seeking an increased engagement with industry, believing the relationship to be mutually beneficial. In the process of doing this, we aim to maintain the objectivity of our institutional and scientific identities. The issue is complex, but a case-by-case examination almost always reveals areas of sensitivity, where mechanisms can be employed to avoid the appearance of conflict of interest.

Attachment One

STRATEGIC PLANNING, PRIORITY SETTING AND RESPONSE TO CHANGING NEEDS:

The State Agricultural Experiment Stations(SAESs) and the Cooperative State Research Service (CSRS) have made functional use of national level strategic planning since 1984 as a means of developing budget proposals and redirecting resources. The Experiment Station Committee on Organization and Policy (ESCOP), which represents the SAESs at the national level, along with its Federal partner, develop a major revision of their strategic research plan every four years. In intervening years, the plan is revised and updated as necessary to meet changing needs and to provide input to the USDA Joint Council on Food and Agricultural Sciences.

The plan is based on state and regional input from the SAESs as well as advice from a wide array of users of the product of research in the system. This includes national organizations representing all segments of agriculture and agribusiness and environmental and consumer groups, among others. Input is also sought from the professional and scientific societies representing agricultural and related scientists at the national level. A series of annual "customer conferences" is conducted to augment written input to the planning process. In these conferences, elected representatives and executives of various national organizations offer advice on needs and opportunities for research. In addition, input is developed from a national conference held every four years in Washington on agricultural research policy, where decision makers provide broad strategic guidance. Developing the ESCOP-CSRS plan involves active participation by all parts of the USDA Science and Education community. Representatives of these agencies attend the drafting workshop and contribute directly to the genesis of the document. Members of the faculty of CSRS are directly involved in generating the document. The ESCOP Planning Committee initiates action on the four-year update about two years before its publication. It becomes very active in developing the revision for a year in advance of its publication.

The revision of the document actually occurs in a major workshop that involves both administrators and senior scientists representing the broad array of scientific and programmatic interests and responsibilities of the SAES-CSRS complex. About one-hundred participants divide themselves into subcommittees that address the six major components of the plan. They consider the several hundred specific inputs from the users of the research product and develop a set of broad initiatives which define the highest priority needs for new information and technology. They also define for each initiative a set of research objectives that are needed to achieve the prescribed goals. There is also an assessment of the resources required to fully implement the recommendations for each research objective.

After the draft has been given tentative endorsement by ESCOP and CSRS, the initiatives are sent to every Experiment Station Director who is asked to rank the initiatives in priority order of importance, based on perceptions of need and opportunity. This grass roots evaluation of priorities is repeated on an annual basis. There is an excellent consensus among regions on the most important initiatives. Likewise, there is good agreement on the initiatives of lower (but important) priority. The mid-range of average priorities has less regional consensus, reflecting the diversity and site specificity of much of what is done in agricultural research.

The product of ESCOP-CSRS planning is a broadly stated document that provides vision and mission statements for the SAESs, a brief background for perspective and an array of highest priority initiatives, with research objectives and resources needed to achieve the goals. It includes a state and regional consensus on relative priorities based on a very broad input from the users of the product of SAES research.

The ESCOP-CSRS plan is one of the inputs to the National Agricultural Research Committee (NARC), which is part of the Joint Council on Food and Agricultural Sciences. This Council, mandated by the 1977 and succeeding Farm Bills, also receives input from similar committees dealing with Extension, Higher Education, and International Programs. The NARC has membership from the SAESs , Federal agencies conducting agricultural and forestry research, non-land grant universities involved in agricultural research, the Colleges of Forestry, Veterinary Medicine, and Home Economics, and the research directors of the 1890 universities. The NARC provides to the Joint Council annual rank-ordered recommendations for research priorities, a semi-annual input for the update of the Joint Council's strategic plan, and annual reports on research accomplishments. The Joint Council meets at least annually with the Users Advisory Board, also mandated by the Farm Bill. As the name implies, this Board is comprised of representatives of the user community who also make recommendations on the budget for science and education to both the Secretary and the Congress. The product of the Joint Council is presented to the Secretary of Agriculture and, in practice, has been a significant input to the budget development process for Science and Education in USDA.

ESCOP participates in the development and advocacy of the budget proposal for the Board on Agriculture of the National Association of State Universities and Land Grant Colleges (NASULGC). ESCOP uses the strategic research plan as the principal guideline in developing recommendations for the annual budget recommendation, maintaining close communication at the early stages of development with CSRS. NASULGC makes a proposal to the USDA for the Science and Education budget in the summer before appropriations are made. ESCOP, along with NASULGC counterparts, evaluate the President's budget in early spring and then take their recommendations to the Congress.

The SAESs are not tightly organized as is the case with federal agencies conducting research and development. They represent a coordinated network of participating state agencies which are part of land grant universities. Their strength lies in the distributed decision

making and programs of research that address the needs and opportunities of individual states. They support a diversified set of agricultural and related industries which are based on the specific natural resources and other factors that also make U.S. agriculture site-specific. Despite the distributed nature of this network, it has a consistent ability to find consensus on the major national issues of overarching importance that require programs of research to provide new knowledge and solutions. There is a growing need and opportunity to share resources and trade-off responsibilities in four regions of the country into which the SAES community is divided.

The ESCOP-CSRS strategic plan has been and is successful in recognizing both the continuing and new needs for research on food, agriculture, natural resources, and the environment. In the past, the system has redirected the existing portfolio of research projects to meet changing national and local needs. The federal government has provided sustaining support for the on-going programs as well as selected new funding in high priority areas. In the present environment, this system is challenged to continue to use the basic procedures now in place for effective planning, but to shift its budgeting strategies towards a reinvestment of existing resources rather than an investment of new resources added to current appropriations. While this has been done in practice at the state level for many years, the system has less experience with seeking and maintaining consensus at the national level in the "net sums" situation.

Academic Programs Committee on Organization and Policy

Academic Programs Section
The Board on Agriculture
National Association of State Universities and Land-Grant Colleges

TESTIMONY

on

Science and Education Priorities at the U.S. Department of Agriculture

Statement to the Subcommittee of Department Operations and Nutrition Committee on Agriculture U.S. House of Representatives

by

James H. Mortensen, chair
Academic Programs Section,
Board on Agriculture
NASULGC

March 25, 1993

The New USDA and Higher Education:
An Imperative

INTRODUCTION:

Mr. Chairman and members of the Subcommittee, I am Jim Mortensen, chairman of the Academic Programs Section of the Board on Agriculture, NASULGC. I am very pleased to have this opportunity to participate in these hearings regarding priorities for the USDA of the future.

Like the function I represent, Academic Programs and Higher Education, this testimony will be small but very, very significant.

RATIONALE:

Recently the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET), and the President's Council of Advisors on Science and Technology (PCAST), issued their reports dealing with the relationship of the federal government to research-intensive universities. Two recommendations from these reports demand your attention.

First from the PCAST report, **"The federal agencies should ensure that their programs encourage universities to re-emphasize education rather than discourage them;"** and from the FCCSET report, **"Federal agencies should examine the impact of federal research support on university undergraduate and graduate education and identify strategies to ensure against unintentional degradation of the educational mission and excellence of the research-intensive universities."**

With these recommendations we strongly agree.

The federal agency link with higher education is especially critical to American agriculture. The American Food and Agricultural system is the world's largest commercial industry with assets exceeding $1 trillion. This great size and the system's very favorable competititve position in the world economy is due in large measure to our ability to substitute scientific knowledge for natural resources and labor.

Thus a strong case can be made for the fact that the most critical challenge to the food, agricultural, and natural resource system in the 1990s will be attracting and educating the requisite human resources. Not enough talented college graduates in the food and agricultural sciences are being produced to fill highly important roles in business, science, and environmental management. Of course the contribution of state funds for the education of undergraduates in the food and agricultural sciences is enormous. Yet critical "catalytic" federal funding is necessary to encourage innovative cooperative programs at our colleges and universities.

SITUATION:

The Office of Higher Education Programs of the Cooperative State Research Service is key to the continued improvement of the quality of higher education in our nation's colleges of agriculture. And this continued improvement in the academic programs is a national need of

great importance if the USDA is to continue to address the needs of an environmentally sound, economically significant American agriculture in order to insure our continued supply of high quality, safe, affordable food for the American consumer.

The Office of Higher Education Programs administers competitive grants programs such as Institutional Challenge Grants, Institutional Capacity Building Grants for 1890 Land-Grant Institutions and National Needs Graduate Fellowships Grants. In addition we are collaborating with this office to develop a Minority Scholars Program to help attract qualified minority scholars to agriculture and the agricultural sciences.

RECOMMENDATION:

Secretary Espy has called for a new USDA which is science-based and user-friendly, a department that utilizes the newest and best science and technology to solve human problems. We concur.

Therefore our recommendation regarding the priorities of the new and visionary USDA is a call for ascendence of higher education in the form of increased support for its office of Higher Education Programs. Inherent in this suggestion is the expectation that the Assistant Secretary for Science and Education will play an increasingly important role in agricultural, environmental and rural development policy.

The Joint Council on Food and Agricultural Sciences, under the direction of the Assistant Secretary for Science and Education, has been the interface for policy discussions between the land-grant community and the USDA science and education administrators. The priorities developed each year by this council play a significant role in directing USDA and land-grant colleges of agriculture activities. A continued and expanded role for this congressionally mandated joint council should be a priority for the USDA of the future.

In addition we recommend that the new USDA make a very special effort to forge a closer link between the mutually agreed-upon priorities of the Joint Council and subsequent USDA funding.

Finally, we would like to point out that the functions of research and teaching, whether formal undergraduate instruction or non-formal extension education, are complementary activities and are best organized in conjunction with each other. Thus any discussion of priorities should thoughtfully consider the necessary close working relationship of research and education.

Again I appreciate the opportunity of participating in these hearings and pledge to your subcommittee the support and expertise of the Academic Programs Section of the NASULGC Board on Agriculture.

NASULGC National Association of State Universities and Land-Grant Colleges

April 2, 1993

The Honorable Charles W. Stenholm
Chairman
Subcommittee on Department Operations and Nutrition
Committee on Agriculture
1301 Longworth House Office Building
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

I appreciated the opportunity to represent the Academic Programs Section of the Board on Agriculture, NASULGC before your Subcommittee on Department Operations and Nutrition. We also greatly appreciate this opportunity to respond to the written questions you submitted at the close of the hearings. The two questions are timely, important and closely related. I would like to answer each question specifically and then provide an overarching answer that addresses the full import of both questions.

QUESTION #1. How does adequate funding for both basic and applied research affect the production of your most important commodity - **Students?** (your emphasis).

As you well know, the designation between basic and applied research is in many cases arbitrary. This is especially so in a discipline such as agriculture which is inherently applied. Hiring faculty to teach and research with either an interest in basic or applied research in and of itself causes no problem for the teaching program if the faculty, college and university have a strong commitment to the education of students. In almost all cases the strength of this commitment is directly related to the emphasis of the reward system. If the faculty reward system is skewed excessively toward research the production of our most important commodity is certainly affected.

QUESTION #2. Do you feel that our Land Grant Universities spend relatively too little or too much on teaching programs compared to research and extension?

Universities spend large amounts of money on their teaching programs. Many feel this sum must be increased. However, when it is compared to the amount allocated by universities for research and extension, it is probably appropriate, although one must note

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that the increase in funding for instruction over the last 10 years has been far less than the increase in allocation for research and service. The major problem is found at the federal level. Very large federal appropriations for research and extension dwarf the funds available for campus teaching programs. As a pertinent example, last year's USDA budget allocated, appropriately, almost half a billion dollars each for research and extension, but barely $18 million for academic programs serving students. This type of funding structure containing perfectly justified funds for research and extension, but woefully inadequate funds for higher education helps drive the university reward system to emphasize research and extension at the expense of teaching.

The critical problem raised by these two questions has been addressed by others in the federal arena. Federal interest in these questions has been heightened because of the realization that educated and trained human capital is a critical national resource and thus a key federal responsibility. The recent report issued by the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) clearly stated its concern with this issue: "**Federal agencies should examine the impact of federal research support on university undergraduate and graduate education and identify strategies to ensure against unintentional degradation of the educational mission and excellence of the research-intensive universities.**"

The President's Council of Advisors on Science and Technology (PCAST) raised the same concerns: "**The federal agencies should ensure that their programs encourage universities to reemphasize education rather than discourage them, even inadvertently.**"

Last year, testimony before the subcommittee of the House Science Space and Technology Committee reiterated this concern: "**if federal agencies follow the lead of the NSF and broaden the base of funding for universities to embrace the full range of scholarly activity, an important concomitant will be increased attention to teaching and the integration and application of knowledge.**"

While the USDA's budget appropriately addresses national concerns in the area of research and extension, it is woefully inadequate in addressing the pressing national need for higher education . As a specific example, the Institutional Challenge Grants program in the USDA, CSRS, higher education budget is structured to deal with the important concerns of our higher education system. It provides opportunities for competitive grants requiring matching funds to address key issues for improvement in the undergraduate educational experience. It is funded at only $1.5 million and thus allows for only 20 grants a year. Simply and generally stated this provides about $60,000 to 20 schools for

educational improvements while those same schools receive many millions more each year to conduct appropriate research and extension. The Graduate Training Fellowships, Minority Scholars Program and 1890 Capacity Building Grants are similar underfunded programs in higher education. This extreme underfunding helps create the excessive emphasis on research in university faculty reward systems and is a specific example of the issue that has concerned the President's Science Committees and the House Science, Space and Technology Committee.

Obviously then this is a national concern that Congress could readily address by significantly increasing the funding for higher education programs in the USDA, CSRS budget.

Your committee could do much to ameliorate this imbalance in USDA support by assuring a key role for the office of higher education in the policy making levels of the USDA. The ascendency of higher education programs at the USDA through both funding increases and an elevated role in policy decisions is an obvious adjustment necessary in any plan for USDA reorganization.

Again, I thank you for the opportunity to appear before your committee and answer these questions. Our organization stands ready to help you and your colleagues wrestle with the important issues facing the USDA, American agriculture and our national competitiveness.

Sincerely,

Jim Mortensen

Jim Mortensen
Chair, Academic Programs Section
Board on Agriculture
NASULGC

JM/kms

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TESTIMONY BY
ROBERT GUERNSEY

ON BEHALF OF
THE COUNCIL FOR AGRICULTURAL RESEARCH,
EXTENSION AND TEACHING
(CARET)

BEFORE THE
SUBCOMMITTEE ON GOVERNMENT OPERATIONS AND NUTRITION
OF THE
COMMITTEE ON AGRICULTURE
U.S. HOUSE OF REPRESENTATIVES

MARCH 25, 1993

Mr. Chairman and Members of the Subcommittee, I am pleased to appear before you today to offer comments on the science and education priorities of USDA. I am Robert Guernsey. A farmer from Indiana, I have a family operation where I produce hogs, beef, corn and soybeans. Today, I come before you on behalf of the Council For Agricultural Research, Extension and Teaching (CARET) where I currently serve as the past chairman. CARET is a national voluntary citizens organization whose grassroots membership is comprised of such individuals as agricultural producers, commodity leaders, agribusiness leaders, state and local officials, homemakers, consumers and members of agricultural advisory boards. Each state and territory is represented by at least one delegate. CARET was established in 1982 as a mechanism through which citizen support could be expressed for the agricultural research, extension and teaching programs of the land-grant university system.

I, like all other CARET members, have greatly benefitted from the unique partnership between USDA and the land-grant university system. Without the assistance I have received during my more than 30 years of farming, I doubt that I would have the kind of farm operation I have today. Through assistance from Extension and resources at my land-grant university, I computerized my operation early-on in the 1980's; I have consistently cut down on the use of insecticides; I am using herbicides in a manner that is sensitive to the environment; and am learning to apply fertilizers in a more safe and efficient manner. This assistance allows me to continue to manage my farm business while adjusting my products to meet the needs of consumers and to comply with farm-program regulations. Our farm operation consists of my wife and I, our son and his family. If I had to rely on professional consultants to assist us in some of the decisions we must make on a regular basis, our costs would escalate which in turn would limit our financial ability to avail ourselves of new scientific knowledge and technology in our farming efforts.

As the present debate ensues on how USDA should look, what its priorities should be and to what extent its programs should be funded, we, in CARET, have the following concerns: (1) that the base programs of Hatch, Smith-Lever, 1890s, etc., be strengthened; (2) that the Extension Service remain one of education and outreach; (3) that an effective balance be struck between basic, applied and mission-linked research; (4) that agricultural academic programs be strengthened within the Department of Agriculture; and (5) that these agricultural research, extension, and teaching programs be allowed to respond to current, as well as future, concerns of both the producer and consumer, such as food safety, water quality, genetic-engineered plants, youth at risk and family problems to name a few.

1. The strengthening of base-program funding of Hatch, Smith-Lever, the 1890's, Morrill-Nelson, and McIntire-Stennis, is CARET's number one priority. These programs provide the infrastructure to the agricultural research and education programs. Base programs guarantee that there will in fact BE a continuing agricultural research and education effort at our land-grant universities. Without base programs, states would not have the necessary flexibility in responding to on-going needs or to situations of crisis. Competitive and special grants, while extremely important and essential, do not and cannot, by their very nature, provide the on-going attention that is necessary. Research, by its nature, requires a long-term effort that does not produce results overnight.

2. CARET believes that Extension must be inextricably linked to the agricultural science and education efforts of our land-grant universities. In order to remain competitive, we, the users, depend heavily on Extension because the transfer of technology takes place through this mechanism. Without the education and training we receive through our Extension Service, we could be cut off from the advances being made through the research done on our own or neighboring land-grant campuses. We, in CARET, would be very concerned if Extension were seen as part of any farm program or regulatory effort. The whole community, the young, the senior, the rural, the urban, and local government feed upon the knowledge and resources flowing from our land-grant institutions.

3. A strong research effort provides the foundation for any scientific and technological advances. We, in CARET, would urge a balance between basic, applied, and mission-linked research so that needs of all kinds can be met. Because of the diverse needs of our society, we would urge that multi-disciplinary research efforts be increased. Knowledge gained from basic research is distributed quickly and widely, but it is the competitive application of applied research that gives me the cutting edge in global competition.

4. Well-educated people guarantee the continuation of new knowledge and progress. It is, therefore, important to CARET that the higher education programs housed within USDA be strengthened. These federal dollars are multiplied many times by state and private dollars while securing high quality talent for the future. This partnership of leveraging support allows entry into the higher education system of the land-grants by individuals regardless of economic or social status.

5. Finally, in order for any of these agricultural research and education efforts to be effective, they must respond to the needs of the American people. We need to continually strengthen the partnership between the user and the researcher so that the right questions are asked and the right problems are worked on for solutions. Many of us in CARET have served in priority sessions and on futuring panels for research, education, and extension. We need to maintain effective advisory boards, which include the participation of both the research and education community as well as the private citizen from rural and urban areas with a wide variety of agricultural groups who are traditional and non-traditional users of the land-grant system. By taking a more comprehensive approach to our communities, we can address many issues and problems that face producers and consumers. Creating effective dialogue between such diversity ensures that I, as a producer, will know what the public wants and how to deliver safe and nutritious products while being sensitive to the impact on my community and my environment.

I want to express my deep appreciation for this opportunity to share grassroots thoughts with this committee about what we feel is vital to our complex communities. I would welcome questions or comments.

CARET

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May 3, 1993

The Honorable Charles Stenholm
Chairman
Subcommittee on Department Operations
and Nutrition
Committee on Agriculture
U.S. House of Representatives
1301 Longworth House Office Building
Washington, DC 20515

Dear Mr. Chairman:

I very much appreciated the opportunity to appear before you and your committee on March 25, as part of your consideration of the science and education priorities of the U.S. Department of Agriculture. I am pleased to respond to additional questions submitted to me after the hearing; my responses follow below.

Question 1a. Do you feel that current base funding is adequate?

In real dollars, base funding has not kept up with rate of inflation which has caused states to either find ways to pick up the slack or cut staff and program. In Indiana alone, within the last six years, 200 extension/research positions on campus and in the field staff have been cut. In some counties of Indiana there is such a strong feeling for extension that county government has picked up the total cost of the agent that was due to be eliminated because of federal and state budgets. A total of 22 Indiana counties out of 92 are now picking up this tab. I feel that a strong base funding in research and extension allows each state to have a structure that can respond quickly to crisis and site specific issues or problems.

Question 1b. How might inadequate base funding influence a university's ability to compete for competitive grants?

If the research/extension staffing is stretched so thin from inadequate base funding, the infrastructure is loaded down handling present programs. Being able to compete for competitive grants puts those states which can't find other funding at a disadvantage from a higher overhead cost perspective.

Question 2a. How do we more effectively target basic and applied research?

I feel that problems or issues of national or regional nature can be targeted by special grants. Although there is much discussion about special grants, I feel that special grants that are regional in nature can address problems or issues with a broad

audience or community impact. Site-specific special grants generally don't have as broad a constituency and there becomes a question of whether this should be state funded and/or possible private funds. Again, this is where a strong formula funded infrastructure creates the ability for states to leverage private funds. (Check-off dollars, private industry, foundations, etc.) to address very important issues or problems that are very site specific in nature. My state, Indiana, has taken the stand that it will not go after federal dollars for site specific problems but will compete very aggressively for dollars that will bring about collaboration with other states. In this case, usually one state is designated the lead and collaborates with other states which have like interests. Through the National Research Initiative (NRI), national priorities can be addressed and is, in fact, focusing on high-priority issues. Most priorities set by the public or users are of the applied research nature and this calls for basic research and/or mission-linked research to bring us to the position of application.

Question 2b. Do you feel there is currently too much basic research being done or too much applied research being done? Describe how each is essential.

Let me give you an example of how a very important break-through will give the corn growers across this country the ability to not only be good stewards of the environment but to also be able to avoid a disastrous harvest situation. Several years ago, I was at the Purdue campus on a tour of the lab work being done. The highlight of the day was the demonstration of the tobacco plant and the ability to manipulate this plant genetically. With this break-through came the question of how long would it be before we could expect the corn plant to produce nitrogen similar to a legume or for the plant to repel insects? I have tried to harvest corn after the southern corn-bore have devastated the crop. Not only is there economic loss with corn lying tangled on the ground, but some of my farm friends have lost arms, legs and, in some cases, their lives while trying to harvest in frustration with equipment that can't handle such a crop. I was in Louisiana a couple years after my Purdue experience and saw genetic work being done on the rice plant. I reported this to Purdue when I got home and found that they were also working with rice but with mission-linked goal of producing a corn plant to not only repel, but possibly to selectively kill, destructive pests while not harming other insects. This was exciting. Even though I was ready for the seed corn when I first saw the tobacco work years ago, I knew that it would take years to bring an application to the farm. This genetic manipulation has moved through the tobacco, tomato, rice, and now to corn. The break-through in rice has other applications elsewhere; but for me, the mission-linked corn project is very important, and I am now awaiting the applied research side to adapt hybrids and bring to the farm a long-awaited product. As a layman, I can't really answer the question as to how much basic or applied research is essential. While I know what my expectations are of applied research, I can't begin to estimate how much basic research has to be done before it's ready for application.

Question 3. How has agricultural research benefitted you personally?

Since I didn't follow anyone in to agriculture, and I did not graduate from an agricultural school, I have been in a continuous mode of education. I depend on the

Extension Service to not only feed me information, but to listen to input of problems and send them up the line to be addressed by research of Extension. As I stated earlier in statements before your committee, we need a strong infrastructure to keep us on the cutting edge of information and application. As an example of my reading and gleaning, I am including ONLY two weeks of articles that I have clipped out of only a few of my agriculture newspapers that tend to get their information from our institutions. They address a wide range of issues, and it is up to me to pick out those for which I need further information and application. I can use my local Extension Agent, or I can resource the university. This can be done several ways - (telephone, mail, electronics, or personal visits). My clippings include:

Exhibit A: Food Issues
Exhibit B: Youth and Family Issues
Exhibit C: Environmental Issues
Exhibit D: Farm Safety Issues
Exhibit F: Production Agriculture Issues
Exhibit G: Miscellaneous Issues and Implications

(The articles are held in the committee files.)

Question 4a. Do you feel that farmers, ranchers and consumers are adequately included in the priority setting process?

Each state probably has their own way of collecting input. Our state uses several ranking devices for research and extension with a cross-section of people in the state. Our state CARET (Council on Agriculture, Research, Extension and Teaching) has three members from every county in the state, and they are a part of this ranking system. I feel that because of state and local funding in partnership with federal dollars, research and Extension do indeed respond to current needs. There is local input needed to get local important dollars, and this process is used at each level. This is not to say that we need not to always be looking for more legitimate voices that are being raised for total community good. I feel that it is not the loud voices that should drive the priority setting, but voices that can sit down to the table and rationally discuss our needs.

Question 4b. How can we more effectively include them?

There needs to be a continuous effort to include the organic, sustainable, traditional production type, livestock, research, Extension, consumer, food processor, banking, agricultural industry, secondary and higher education, local and state government, forestry, environmental, etc., persons. We need to accept that some farmers, ranchers, and consumers are like students in the public schools. The taxpayers pay for public education, provide for transportation in most cases, and even provide meals at a reasonable cost (some cases free); and yet, there are some who will not finish high school and later will say that the school never did anything for them. Yet, out of that same school will come doctors, teachers, scientists, entrepreneurs that include farmers and all kinds of self-employed, even our future researchers, and all kinds of skilled labor and technicians. The information and knowledge base is there for the taking but we as individuals need to identify what it is that we want before we can get answers.

We have, by Congressional mandate, two committees that are organized within USDA to evaluate and prioritize for the future in the Users Advisory Board and the Joint Council. The UAB is a cross-section of people and could be a very effective tool to use at the federal level. Unfortunately, with the cut in the budget, UAB and JC only meet two times annually, which leaves these federal committees somewhat ineffective. Congress needs to make a decision to either have federal committees with such a cross-section to be effective or to just do away with them. Our national CARET has had a liaison to these Boards, and we have input into the process. As an example, Rich Rominger, who was recently named as Deputy Agriculture Secretary, is a farmer and was CARET's liaison to the Joint Council.

On the day I was present before your committee, I heard a statement about the disconnection between the user and the Extension/research institution. As a user and a producer, I don't see such a disconnection. In fact, I see a closer tie to the people who really want to work with the system. The system can always be refined, but I find that many people don't use the system and then blame it when times are tough.

CARET is a cross-section of volunteers who are seeking ways to assist decision makers in the Congressional, administrative, academic, commodity groups, and research/Extension areas. We need to improve our communication skills and strive to be representative of our states. Meeting and working with such a diverse group of people from across the country that makes up CARET has broadened my horizon and gives me a perspective that goes beyond the farm gate. It is with this though that I hope I have given you some of my views that are truly grassroots. Once again, thank you for this opportunity.

Sincerely,

Robert Guernsey

Robert Guernsey
Past Chair

enclosures

NASULGC National Association of State Universities and Land-Grant Colleges

TESTIMONY

Before the

SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION

of the

COMMITTEE ON AGRICULTURE, U. S. HOUSE OF REPRESENTATIVES

on

Science and Education Priorities at the U. S. Department of Agriculture

Presented by

Dr. R. Rodney Foil
Vice President for Agriculture, Forestry, and Veterinary Medicine
Mississippi State University
Mississippi State, MS

and

Chair
Council of Administrative Heads of Agriculture
Board on Agriculture
National Association of State Universities and Land-Grant Colleges
Washington, DC

March 25, 1993

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Introduction

Mr. Chairman and members of the Subcommittee, my name is Rodney Foil. I am the Vice President for Agriculture, Forestry, and Veterinary Medicine at Mississippi State University. In addition, I serve as current Chairman of the Council of Administrative Heads of Agriculture within the National Association of State Universities and Land-Grant Colleges. On behalf of my colleagues, I want to thank the Subcommittee for their interest in the important issues facing agricultural science and education in the United States and the world.

Background

My role today is to pull together some of the more cross-cutting issues covered today. In doing so, I will focus more on the philosophical and longer term issues, in an attempt to summarize and highlight certain areas. As you continue your deliberations on this and related topics, we hope that you will find our statements to be helpful and thought provoking. Each of us, as well as our associates in every state in the union, will be most happy to return any time that you feel our participation can be of benefit.

Summary Statements

The testimony presented today contains a wealth of information regarding our current system for setting priorities, conducting programs, and relating our activities to the broader educational community, the federal government, and, most importantly, the users of the research and technology that is being developed. In summary, I would like to stress five characteristics of our system which are important to your deliberations, and should form part of the basis for the important policy development process with which you will be involved.

1. The land-grant system is broad and deep. From previous testimony, and from your own personal experience, you should be aware of the breadth and depth of the land-grant university system, both in function and in disciplinary capacity. Our activities range from pioneering efforts in the most fundamental of sciences to hands-on assistance to millions of U.S. citizens with their lives and livelihood. From our first and most fundamental mission, that of educating tomorrow's professional leaders, to teaching basic parenting skills to teen-aged mothers, our faculty members each day address issues critical to the future of our nation. While our roots, and our major emphasis is on agriculture and family life, and our primary linkage to the federal government is through the U.S. Department of Agriculture, the increasing complexity of today's society has resulted in activities and programs that support and amplify virtually all aspects of human activity and collaborate with numerous departments of government.

The breadth and depth of this interesting capability represents a great strength for the nation, and at the same time, its complexity presents challenges to those of us who seek to guide and direct these activities. As you continue to explore ways in which we can improve our planning and priority setting, as well as our implementation of programs, I know you will look broadly upon our capacities, and continue to challenge us to serve through multiple functions across broad areas of human interest.

2. Strength through inter-dependence. Along with a broad range of subject matter competency and functional activity, the land-grant university system of academic programs, fundamental and applied research, and extension education, forms a complex web of inter-dependent relationships. Faculty creativity, the most precious of our human resources, can be focused across a broad spectrum of human needs, and is often redirected to meet new challenges and opportunities. This inter-dependence provides both serendipity and the opportunity for redundancy without loss of efficiency. To fully draw on this strength requires an understanding of the manner in which the parts interact. While change can be both rapid and positive, care must be exercised to prevent unforeseen damage elsewhere within the system.

3. Partnerships can support strong priorities. The long time partnership between federal, state, and local entities supporting the land-grant system has proven its effectiveness. As this model is applied across a broader and broader range of subject areas and functional relationships, the need to harmonize the priority process increases. As has been mentioned, federal funding for activities within the land-grant system is augmented better than three to one by non-federal funds. This synergistic relationship is possible because priorities identified at all levels receive appropriate attention. Utilization of the varied funding arrangements now available makes it possible to target priorities of variable interests in a most efficient fashion. As the capabilities of the university system are focused on more and more broad objectives within the Department, and as these programs are combined with programs of interest to other Departments of government, the need to redefine the partnership becomes more critical.

4. America's higher education system is changing, and land-grant agriculture is at the forefront. Few can argue that America's system of higher education is the envy of the world, yet recent years have brought unprecedented change in public satisfaction with and expectations of this system. As perhaps the most visible and client oriented element of this system, the land-grant agricultural units have undergone intense self examination and rapid change during the past decade. These

changes have been dramatic, and are not yet complete. As the parent institutions redefine their role, and as the national system of higher education develops new paradigms for meeting changing needs, the land-grant units will be called upon to further manage change and modify both structure and function to match new expectations. While these changes may enhance the ability to respond to national interests of the Department, there is also the possibility that shifting priorities will dictate reconsideration of relationships.

5. Land-grant: where the grass roots meet the ivory tower. For over a century, the land-grant university agricultural system has balanced the short-term imperatives of local clientele with long-range opportunities identified by minds functioning at the forefront of human knowledge. This unique approach to setting priorities, identifying opportunities, and implementing programs has proven to be a most effective means of infusing science into the daily activities of productive citizens. It is evident that the future of our nation is heavily dependent on our ability to capitalize on past experience and extend these abilities to ever-changing problems and opportunities. You may be assured that this system is both strong enough and flexible enough to continue its productive role in the Department of Agriculture of the future.

RESPONSES OF R. RODNEY FOIL TO WRITTEN QUESTIONS

Question 1: How well is forestry research funded at USDA?

Response: Not well at all.

The two main sources of support for forestry research are the USDA Forest Service budget and McIntire-Stennis funds administered through the Cooperative State Research Service. A report issued by the National Research Council in 1990 entitled "Forestry Research: Mandate for Change" reported that Forest Service research funding had declined 14 percent (1982 $) during the previous 10 years. During the same period, McIntire-Stennis funding remained essentially level. Since 1990 Forest Service funding has increased somewhat while McIntire-Stennis funding has declined to its 1982 level. (Attached table) This situation has been exacerbated by a five-year decline of 50 percent in industry-sponsored forestry research.

Funding levels for forestry research are in sharp contrast to the growing public perception of the importance of forests and the many societal needs and concerns related to the economic and environmental role of forests. Accordingly, the National Research Council recommended the following: (1) increase competitive grants for forestry research to $100 million annually; (2) increase USDA Forest Service research budget by 10 percent each year for the next five years; (3) increase McIntire-Stennis funds over the next five years to the full authorization level of 50 percent of the Forest Service research budget (currently McIntire-Stennis support is approximately 10 percent of the Forest Service research budget).

I concur with these recommendations. The forestry research community, in common with the administration and members of Congress, is caught up in the growing public concern over ancient forests, threatened and endangered species, global warming, wetlands, wilderness preservation, tropical deforestation and related environmental issues. Regrettably, the science to which resource management and national state and local policy measures can be anchored is simply inadequate. The urgent need for research on environmental issues related to forest lands is most apparent at the state and local levels. Management of land for timber, water, wildlife and recreation is becoming increasingly more difficult and expensive for lack of reliable information on the best management and harvesting practices on a site-specific, landscape and regional basis. It is noteworthy that environmental research was ranked first among research needs - above timber production - by the Southern Industrial Forestry Research Council, an organization representing the major forest-based industries in the South.

Forestry and the associated industrial base account for a significant fraction of our GNP and are of fundamental importance to the economy of literally hundreds of communities across the United States. There is convincing evidence that forestry will become even more important in the future. Global demand for forest products is increasing. This increase in demand coincides with diminishing wood supplies in many established wood-producing countries of the world. The United States is well positioned in terms of timber supply and manufacturing and transportation infrastructure to satisfy a major share of this increase in demand. However, continued profitably of forest-based industries will require: (1) that we develop more efficient and environmentally compatible production and processing systems if we are to compete in a growing international market where competition is also increasing; and (2) that we resolve some of the environmental issues which threaten to disrupt timber supply - demand relationships. Both of these will require additional investments in research.

Question 2: Some individuals feel that the placement of forestry within USDA represents a conflict of interest. Where do you feel forestry should be placed in any reorganization scheme?

Response: Rather than being a conflict of interest, the association of agriculture and forestry in USDA has been highly complementary. The two share many things in common. The science base, economic principles, and management concepts to which the practice of agriculture is anchored are also applicable to forestry. Additionally, they share many of the same problems - economic, social, and environmental - and benefit mutually from the solutions to these problems. At the local and state level, forestry and agriculture are inseparable. Together, they provide the economic underpinning for much of rural America.

The question of where forestry should be located within the federal organizational structure has been studied extensively in the past. The conclusion from these studies that forestry should remain in USDA is still valid. The benefits both presently and prospectively of the association between agriculture and forestry outweigh any benefits that may result from moving forestry out of this department.

Question 3: As an administrator, how do you include "cross-cutting" initiatives in your planning process?

Response: In our setting, initiatives may be considered "cross-cutting" for any one of three reasons. Some initiatives cut across disciplinary lines, and require special mechanisms in order to ensure appropriate coverage of the areas of expertise necessary for an optimum solution. A second form of "cross-cutting" issue has been increasing in its importance in recent years, and those are issues that cut across commodity or clientele areas of interest. Such issues as water quality, environmental protection, and food safety are good examples of these kinds of issues. A third kind of issue that requires special attention is one that cuts across functional areas of the university. Since we are funded under separate directives for teaching, research, and extension, we sometimes have to exert special effort to assure that all functions are considered appropriately.

As the university vice-president in charge of all functions and disciplines directly related with agricultural and forestry problems, a good deal of my personal effort must be directed to assuring appropriate consideration for the issues described above. Unit managers, be they heads of functional, disciplinary, or commodity focused units in our system are routinely involved with planning activities extending beyond their area of direct responsibility. All program planning and implementation teams are formulated to assure participation by a variety of faculty members across disciplines and functions.

Perhaps the greatest stimulus to good planning with regard to cross cutting issues is the direct involvement of clientele representatives in program planning and evaluation activities. Those who apply the results of our science and technology in their everyday activities are quick to point out omissions of coverage.

In summary, proper attention to cross disciplinary, functional, or commodity lines presents a unique challenge to any administrator. In a university setting, these challenges are sometime exacerbated by reward systems and peer pressure. One of the substantial strengths of the land -grant system is the maintenance of mission oriented and directed research responsibilities in the experiment station director, along with clear responsibilities for extension programming through the extension director. When those two agencies are appropriately meshed with the academic structure supporting the teaching mission, one can be reasonably sure that cross-cutting issues will be adequately considered.

(Attachment follows:)

Forestry Research Appropriations, USDA, 1978-93

Year	USFS Million $ Actual	1982	McIntire-Stennis Million $ Actual	1982	USDA Total Million $ Actual	1982
1978	88.4	122.1	9.5	13.1	97.9	135.2
1979	93.9	120.8	9.5	12.2	103.4	133.0
1980	95.9	111.3	10.0	11.6	105.9	122.9
1981	108.5	116.2	10.8	11.5	119.3	127.7
1982	112.1	112.1	12.0	12.0	124.1	124.1
1983	107.7	102.9	12.5	11.9	120.2	114.8
1984	109.4	99.5	12.7	11.6	122.1	111.1
1985	121.7	105.9	13.1	11.4	134.8	117.3
1986	120.1	101.5	12.4	10.5	132.5	112.0
1987	132.7	107.7	12.4	10.1	145.1	117.8
1988	135.5	105.2	17.5	13.6	153.0	118.8
1989	137.9	108.9	17.5	13.9	155.4	121.8
1990	150.9	114.5	17.3	12.2	168.2	126.7
1991	167.6	122.2	17.8	13.0	185.4	135.2
1992	180.5	126.6	18.5	13.0	199.0	139.6
1993	184.3	129.5	18.5	12.0	202.8	141.5

Source: "Forestry Research: A Mandate for Change", Tables 2-1, 2-2; 1989-93 data from CRIS & USFS
*Deflator used, Gov't Goods & Services

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PRIORITIES FOR AGRICULTURE RESEARCH AND EXTENSION AT USDA

Statement of the American Veterinary Medical Association and the Association of American Veterinary Medical Colleges

March 25, 1993

Mr. Chairman and Members of the Department Operations and Nutrition Subcommittee:

Veterinarians are uniquely poised to assist both the Congress and the U.S. Department of Agriculture in setting research priorities on animal health, disease and other disciplines related to agriculture and public health. As clinicians, every day we take basic science and transform it into practical application on the farm, in the laboratory, in private corporations, in non-profit organizations, and in our hospitals, clinics and university facilities. We view ourselves as facilitators and implementors of animal research information transfer.

The profession bridges the public and private sectors through enthusiastic business and entrepreneurial spirit, meeting matching funds with corporate grants, and seeding private and industrially cosponsored projects, to promote the creation of new research ideas, products and technologies. For example, one school of veterinary medicine is engaged in a major research partnership with private industry to develop a new class of compounds that stimulates animal immune systems and aids in wound healing.

In another project, the pet food industry funded a nutritional research project on cats. Veterinary researchers were able to make a crucial determination that taurine deficiencies in pet food formulations could lead to a triad of disease syndromes, including heart disease (cardiomyopathy), reproductive failures and blindness. Once this discovery was made, the researchers made simple nutritional formula suggestions to the manufacturers of commercial pet foods, thus leading to a quick and effective solution to a complex problem for pet owners, the veterinary profession and the pet food industry.

The dairy industry has been concerned about the increasing incidence of coliform mastitis. To address this, a state milk advisory board entertained proposals for control methods for this form of mastitis, awarding a veterinary faculty member funding to address vaccine research on a mutant form of E. coli J-5. The vaccine developed has proved very successful, and the faculty member is now working to help identify a vaccine company to prepare vaccines for national and international industry use. In that state alone, the vaccine is saving the dairy industry over $11 million annually.

The facilities within which we perform our agriculturally-related research range from primate centers to extension field stations, from sophisticated diagnostic laboratories to conservation centers at zoological parks. We are striving daily to turn our basic research not only into practical applications, but to provide society and the nation as a whole with safe, wholesome foods, effective and efficacious vaccines, comfortable and well-cared-for domestic and wildlife animal species, high caliber diagnostic laboratories and laboratory tests for the detection of animal disease and biohazards, and environmental health and maintenance through our research on water quality, genetic engineering, conservation, and epidemiological expertise during epidemics and natural emergencies.

For example, many animal disease research programs, such as those on brucellosis and tuberculosis, are heavily dependent on animal biocontainment facilities in which testing of new vaccines occurs in animals challenged with virulent organisms. On average, a single biocontainment facility for a single steer can cost nearly $500,000 to construct and about $100,000 a year to maintain and operate. A lack of adequate biocontainment facilities across the country can result in delays in critical experiments on nationally significant diseases. Modern and adequately sized biocontainment facilities are necessary in order to safely move scientific discoveries from the laboratory to the field and apply them effectively for the improvement of animal agriculture.

Primate centers are another example. Up to 3,500 nonhuman primates can be housed at these centers, where veterinary faculty researchers carry out investigations on AIDS, environmental toxicology, reproduction and other research of significance to public and animal health. The average cost of maintaining such a facility is approximately $5.1 million per year.

Finally, the AAVMC and the AVMA would specifically like to address three issues brought up at your Subcommittee's hearing on March 25, 1993: (1) How to best apply basic research for public wants and needs; (2) How to address accountability, whether it be in relation to peer-reviewed/merit-reviewed research or earmarked site-specific research; and (3) How to balance competitive grant funding with formula-funded research.

Dr. Savage stated in the question and answer session of the hearing that universities often focus only on basic research, and pay mere lip-service to applied research. At veterinary medical schools and colleges, clinicians and researchers work hand-in-hand, in the hospitals and in the field to address basic research that will solve practical problems. We meet and greet the public every day, gleaning detailed medical histories of our patients from their owners; then we change hats, move to the laboratory and become or at least collaborate with the laboratory bench scientists.

Whether the issue is veterinarians investigating surgical procedures and materials necessary for orthopedic hip replacement (both within veterinary and medical school capacities), so that both animals and humans with severe arthritis or osteoporotic lesions can live in comfort,

whether the issue is a cooperative scientific effort between veterinary microbiologists and food scientists (involving veterinary medical schools, veterinary and animal science departments and food science departments), such as occurred at the University of California the day after the foodborne E. coli outbreak began in the Pacific Northwest, or whether the issue is a comparative examination of animal models for the investigation of diseases transmissible from animals to humans, i.e. protection of the public's health regarding diseases such as rabies or tuberculosis, the only functional approach is the team approach, relating basic science data to practical solutions. Veterinary medical researchers are not able to remain cloistered in their ivory towers, far removed from practical hands-on applications, because research and practice exist side-by-side in veterinary medical training facilities.

As academicians, veterinarians understand the amount of time and effort "peer-review" or "merit-review" involves. With the incredible amount of scientific information being generated daily, accountability reporting, as much of an added cost of time and effort as it may be, is the best way to track animal disease, treatment, response and health. Accountability details effectiveness of basic science applied to public needs, and helps assure those providing the funding that hard work is ongoing. In our veterinary medical colleges and schools, we continually must sort out what scientific research project proposals to accept and what ones to deny. Clinical veterinarians regularly contribute to the scientific literature by writing, editing and re-editing peer-reviewed scientific journal articles. Each of these activities involves deciding where the funds that come to our institutions and facilities will be best spent. We understand what centers of excellence are, because we see the full-spectrum, big-picture of science from basic laboratory research to client histories about their animals' health to practical applications.

In transference of basic to applied science, the norm is modification of ideas rather than outright acceptance or rejection. Yet, as veterinarians, we realize that scientific claims can only be validated by constant, continuous long-term observations, generating repeatable data to back up those claims. Formula-funded research, as long as accountability is there, can be equally as valid as competitive research, in that often in the course of experimentation and in the process of proving or disproving an hypothesis, we come up with results and practical applications that are not able to be anticipated at the start of a scientific project. The excitement of discovery is what draws us to science, and the satisfaction of applying what we derive in the laboratory to the animals we work with every day sets the profession of veterinary medicine in a distinct category of its own. As veterinarians we are committed to science, animals and people, and thus are uniquely poised to assist in determining research priorities.

We hope that the Subcommittee on Department Operations and Nutrition will consider our veterinary clinicians, our professional veterinary medical school researchers and academicians, and our Federal veterinary practitioners as expert witnesses should you decide to hold further hearings or meetings on this most crucial and pivotal issue of priority setting for agricultural and extension research programs. Please do not hesitate to call upon us as you continue to examine these important issues.

International Committee On Organization And Policy

International Section
The Division of Agriculture
National Association of State Universities and Land-Grant Colleges

Statement

on

Science and Education Priorities U.S. Department of Agriculture

An International Perspective

Submitted to

Subcommittee of Department Operations and Nutrition
Committee on Agriculture
U.S. House of Representatives

by

Monika C. Escher, Chair
International Committee on Organization and Policy
Board on Agriculture
NASULGC

Mr. Chairman and members of the Subcommittee, I am Monika Escher, Chair of the International Committee on Organization and Policy (ICOP), of the Board on Agriculture, NASULGC. I am pleased to have this opportunity to participate in these hearings on the science and education programs at USDA.

The rapid spread of technological change is revolutionizing virtually all aspects of our lives, from the genetic mapping of plants to the near-instantaneous transmission of information anywhere in the world. In order for the United States to sustain a competitive advantage in the world, the U.S. science and technology base must be maintained and enhanced. Any reorientation of the USDA science and education agencies must consider that the prosperity of U.S. agriculture will depend on our active participation in the global science and education networks.

Developing international research, higher education, and information programs that result in economic benefits to U.S. farmers can be accomplished by systematically linking the U.S. science and education community -- the land-grant system -- to its international counterparts. Global interaction can be realized in the following areas:

- Research: Collaboration with international agricultural research centers is necessary to ensure that U.S. scientists have access to state-of-the-art products and technologies. New relationships with overseas agricultural research institutes need to be established.

- Higher education: Internationalizing higher education programs will create a human resource base educated to successfully function in the global marketplace.

- Information: Rapid access to global information is essential in order for U.S. agricultural scientists to keep pace with global scientific and technology developments.

In the 1990 farm bill, Congress authorized an enlarged role for USDA in terms of collaboration with institutions throughout the world engaged in agriculture and related research and extension activities. The international dimension of science and education, not as a separate component, but fully integrated into USDA, must be a priority.

NASULGC National Association of State Universities and Land-Grant Colleges

TESTIMONY

Before the

SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION

of the

COMMITTEE ON AGRICULTURE, U. S. HOUSE OF REPRESENTATIVES

on

Science and Education Priorities at the U. S. Department of Agriculture

Presented by

Dr. C. Peter Magrath
President
National Association of State Universities and Land-Grant Colleges

March 25, 1993

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SCIENCE AND EDUCATION PRIORITIES AT THE U. S. DEPARTMENT OF AGRICULTURE (USDA)

Statement to the Subcommittee on Department Operations and Nutrition

Committee on Agriculture

U. S. House of Representatives

Mr. Chairman and members of the Subcommittee, I am C. Peter Magrath, President of the National Association of State Universities and Land Grant Colleges, (NASULGC). I am very pleased to have this opportunity to participate in these hearings regarding science and education priorities at the U. S. Department of Agriculture. As president of NASULGC, whose membership includes all 73 land-grant universities, I wish to convey our deep concern for the future of the science and education programs in research, extension and education, and for strengthening the long-standing collaborative USDA/land-grant partnership that has served America so well for more than a century. As pointed out recently by columnist George Anthan of the *Des Moines Sunday Register*, "Our Agriculture Department, especially its research and extension functions, are the envy of the world."

Both the United States and the world, and therefore the environment in which the land-grant universities and the U.S. Department of Agriculture operate, have changed dramatically since the early fruition of the land-grant university movement. For one thing, American agriculture today has totally changed so that less than two percent of our citizens are directly involved in production agriculture. The very success of the scientific revolution in agriculture, led by the land-grant universities in close collaboration with and significant support from Congress through the U.S. Department of Agriculture, has made archaic and unnecessary many of the practices and structures of the old or traditional land-grant model. However, the basic principle--pioneering basic research in agricultural science, the application of science to the problems of food, environment and renewable resources, dissemination of knowledge through the Cooperative Extension System--all remain relevant.

As we are so well aware, the United States faces massive problems converting from a substantially defense-driven economy, while at the same time adjusting to the new realities of world trade and competition, reinvigorating its industrial competitiveness, dealing with the massive problems of education and addressing major environmental and infrastructure needs.

Such consequential political and economic transformations challenge all of us to look closely at the mission, structure, and constituencies of our organization. It occurs to me that the U.S. Department of Agriculture and land-grant universities, again, have both an opportunity and a need in common. It is the opportunity and need to redefine our constituencies--to identify the sectors of our citizenry for whom we have the capacity to improve their quality of life. Certainly that includes farmers and ranchers. It also includes a significant number of others who live in

rural America. Likewise, we both have the capacity and are currently doing a great deal to improve their nutrition and health, and to improve the educational opportunities of those who live in both rural and urban areas.

Let's look for a moment then at what we do best, what the preeminent land-grant system has to offer the American citizen and the U.S. Department of Agriculture. Those who argue that the mission of higher education ought to be narrow--focused exclusively on studying and learning about the world but not being engaged with the needs of the world--do not understand the true purpose of higher education. The purpose of higher education, certainly land-grant education, is to serve the needs of the people in ways that flow out of the skills and knowledge of our colleges and universities.

Addressing your interest in an active, positive role by extension, what I call the "new land-grant model," means serving social and economic needs as determined by society through its elected representatives in collaboration with university leaders on a basis of mutual discussion, negotiation, and trust. It is the land-grant model in the sense that it is based on the principle of extending knowledge--reaching out--to meeting ever-changing social, economic, and human needs. It involves extending and linking the research base within both the USDA and research universities with producers and consumers as well as with businesses, with community and local, state and other federal agencies, and with volunteer public service associations in order to deal with environmental and other societal challenges. This assertive role must be a broad and collaborative one if we are to achieve the kind of consensus and support essential to effective and sustainable extension efforts. Social progress depends on economic progress, and both depend on effective, sustained education that promotes understanding and knowledge, and extends that knowledge to our society.

This is what we, the land grant universities, have provided our citizens and society over the last century, and this is also what has helped forge such a successful partnership with the USDA and American agriculture. Virtually all observers would agree that American agricultural production has been one of the wonders of the world because of the linkage that was developed between university faculty, practitioners in the field, and USDA scientists. It is imperative therefore that as we look at change in the USDA, we keep in mind the concomitant change taking place in our society and its institutions in order to insure ourselves that the new USDA meets the needs of our future.

Secretary Espy has articulated his vision of the new USDA as one that is "science-based and user-friendly." This vision based on science to serve the people parallels perfectly the land-grant universities' re-commitment to acquiring new knowledge and sharing that knowledge in the service of the people. It is also the right approach for a federal department that finds itself at the very interface between emerging technology and the timeless problems of people.

It is our understanding that the USDA will undergo restructuring in the near future, and our recommendations for such restructuring address those areas of the department's mission that must utilize modern science and technology to solve critical human problems. We believe that reorganization should include the ascendence of research, extension, and higher education in the form of increased emphasis on the role and mission of the Cooperative State Research Service, Extension Service and the Office of Higher Education. Inherent in this suggestion is the expectation that Science and Education will play an increasingly important role in determining agricultural, environmental, social and economic development policy. In addition, we believe that the Science and Education community should not be constrained by traditional limitations, but should be encouraged to work across the department. Increased interaction and collaboration between Science and Education and relevant USDA agencies--and indeed with other federal departments--is essential for a more functional and effective Department of Agriculture.

The research, formal undergraduate, graduate and non-formal extension education responsibilities have many commonalities, both in constituencies and functional relationships. These commonalities are mirrored in the organizational structure of universities which use the same scientists and scholars for their research, teaching and extension efforts. In any reorganization effort, provision must be made for strengthening the close working relationships among these functions.

Our land-grant universities have been leaders in the scientific and technological breakthroughs that are providing an entirely new way of communicating information through computer technology and electronic systems. These advances are fundamentally changing the way in which information and education are being transmitted and will be transmitted in the future. Such technology should be considered integral tools for a redesigned USDA eliciting improved service and simultaneously achieving budgetary savings.

The USDA Joint Council on Food and Agricultural Sciences has been directed by Congress to improve the planning and coordination of research, extension and higher education, and to relate them to the federal budgetary process. The Council membership includes federal agency and land-grant university administrators, thus providing a forum for understanding and assessing ongoing changes in agriculture. Continued strong support of this council will enhance coordinating efforts in setting programmatic priorities.

Recent recommendations by both the Federal Coordination Council for Science Engineering & Technology and the Presidents Council of Advisors on Science & Technology recommend that federal agencies such as the USDA play a stronger role in support of undergraduate and graduate education at our nation's colleges and universities, especially those designated "research-intensive universities." We agree with this recommendation and suggest that any USDA reorganization strengthen the department's role in higher education through the Office of Higher Education in the Cooperative State Research Service. This support is especially critical

when we realize that the 1890 Land-Grant Capacity Building Grants and Minority Scholars Programs, those programs specifically designed to enhance minority involvement in agriculture and agricultural sciences, are a responsibility of this office.

One of the questions you asked in your letter of invitation to testify, Mr. Chairman, concerned optimum modes of funding. I would suggest that there is substantial merit in continuing a combination of formula and competitive grant funding. Formula funds, along with state funding, permit each state to maintain that essential core of faculty and staff that an institution must have in place to provide a degree of continuity and the capacity to respond immediately to crisis situations.

It has been my honor and pleasure to present this statement today to the Subcommittee. My colleagues of the NASULGC Board on Agriculture, who were also invited to testify today, will address your specific questions in more detail.

Association
of Administrators
of Home Economics

In State Universities and Land Grant Colleges, Inc.

TESTIMONY

Before

THE SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION

of

THE COMMITTEE ON AGRICULTURE
U.S. HOUSE OF REPRESENTATIVES

on

Science and Education Priorities at the U.S. Department of Agriculture

Presented by

Dean Barbara S. Stowe
Dean, College of Human Ecology, Kansas State University and
Asst. Director Agricultural Experiment Station, Kansas State University
Manhattan, Kansas

Chair
Research Committee of Board on Home Economics
Strategic Planning Committee of Board on Home Economics

March 25, 1993

Statement of the
Association of Administrators of Home Economics and
Board on Home Economics of the
National Association of State Universities and
Land Grant Colleges on
Reorganization of the United States Department of Agriculture

The Board on Home Economics (BOHE) is one of five which constitutes the Commission on Food, Environment, and Renewable Resources of the National Association of State Universities and Land Grant Colleges (NASULGC). The Board is composed of representatives of the Association of Administrators of Home Economics who are deans of colleges in the land grant university system, and/or directors of research and extension education programs. This board brings to the Commission on Food, Environment, and Renewable Resources expertise to address the needs of families —elderly, youth, and children; nutrition and its relation to human health; food quality and food safety; product development for multicultural consumer markets; resource management for limited resource families among others. The Board on Home Economics, as a constituent member of the Commission on Food, Environment, and Renewable Resources, interacts with the Boards on Agriculture, Veterinary Medicine, Forestry and Natural Resources, and Oceans and Atmosphere for strategic planning, and for development of budget and policy recommendations for the science and education functions of USDA.

It is the strong symbiotic relationship between the land grant university system and USDA which heightens our interest in reorganization of the latter. The Board on Home Economics supports the principles set forth in President C. Peter Magrath's letter of February 23 to Secretary of Agriculture Mike Espy. We take this opportunity to emphasize some specific factors which the BOHE would like to have considered in reorganization plans and which we believe will enhance the ability of the USDA to capitalize upon the strengths within our Land Grant colleges.

Science and education has related functions of discovery and dissemination which operate very effectively through the land grant structure which links higher education for the preparation of scientists and teachers, research, and extension education which disseminates science-based information to the public. Science and education of the USDA is likely to benefit from some reorganization, but the relationship of the higher education, research, and extension education functions under the same Assistant Secretary is paramount to their effectiveness. The contemporary extension education component is increasing in importance as the knowledge base increases exponentially.

The Clinton administration has placed emphasis on restoring vitality of the U.S. economy, part of which is putting displaced workers into productive jobs. U.S. agriculture has experienced enormous transitions, including the major transition from the family farm to corporate production. The USDA should be expected to play a role in helping the country and the economy adjust to transitions that it has played a role in helping to create. Science and education is providing educational support for communities, families, and small businesses to productively weather transitions. The system is in place to effect such support;

it is a matter of adjusting priorities to better utilize that system. No other government agency has a nationwide system or network that the USDA has through its regional research and cooperative extension systems. Through state, county, and private partnerships, federal dollars are effectively leveraged. It would be costly not to utilize what is in place, or worse yet, reinvent it.

The USDA, through a system of 73 land grant universities, has in place a structure which provides working relationships between predominately black and predominately white institutions. That is an important asset for an increasingly multicultural and multiethnic society. Assuring quality nutrition requires an understanding of cultural differences in food preparation and eating patterns, assuring global markets for the food and fiber products of U.S. agriculture requires an understanding of cultural and ethnic differences within those markets, and assuring a productive workforce requires the ability to capitalize upon skills of a multicultural society.

Human nutrition and food science are key components of science and education of the USDA. Any reorganization must retain the links among quality human nutrition, food product development, and production of the food supply in the research and information dissemination units of the agency. These links exist within the land grant universities, espcelally within colleges of home economics, agriculture, and veterinary medicine. Public concern about the relationship between food consumption and overall human health has reached an all time high in the 1990's. Dietary excess or imbalance has been implicated in half of the leading causes of death in the United States. While the food supply in this country is recognized as high quality, concerns continue to grow about microbial and chemical contamination. Land grant colleges are the source of information to deal with food safety concerns and to create new knowledge where information gaps are evident. Perception that food is unsafe is as potent a force in determining consumer choice as the reality of measured levels of contamination. Social scientists in the colleges represented by the Board on Home Economics have the ability to accurately measure and interpret consumer perceptions. Nutrition researchers in these colleges have the capacity to determine the relationships between nutrients and levels of other substances in food as they impact human health. And our extension educators have the ability to interpret complex research findings in ways that can enable citizens to make informed decisions about food choices. We must expand our nutrition information base and educational strategies to meet the needs of a more diverse population. Americans now consume 43% of their meals away from home. Consequently, the food service and processing industries are making new demands for research based information on nutrition and food quality. Consumers who do eat at home, are demanding more convenience in preparing those meals.

The decade of the 1980's exemplified the urgent need for research that contributes to solutions of rural family and community pressures associated with the cost—price squeeze, declining rural populations and an aging population. Strategies to enhance the economic health of rural communities is a national priority within the USDA. Human development and other social scientists within our land grant universities have the ability to assess citizen attitudes and needs in ways that will provide an accurate information base for policy makers and community development organizations. There is clear evidence that families and communities can find many of their own solutions to problems of health care, teenage pregnancy, housing and services for the elderly if they have the information base and the

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leadership skills to do so. For too long we have neglected development of the social science information base that would help assure viable families and communities, and build a competent work force that will sustain the agricultural enterprise and related economic development.

The development of new markets will generate additional income that will stimulate economic growth in rural America. Enlightened market development starts with the premise that we identify what the consumer wants; whereas, unenlightened market development starts with the premise that we must convince consumers that they want to buy what we have to sell. Within our land grant universities we must develop a better information base on consumer wants and interests and recognize that consumers are a complex group of culture and ethnicity, age range, and economic capacity.

New research in processing and adding value to raw products can result in the development of new markets for agricultural commodities and overall enhanced economic activity based on new products and processing technologies. Research in this area has the potential for converting waste products into usable items and for creating new and modified products which are environmentally compatible. Land grant universities have the ability to put together interdisciplinary research teams of nutritionists, food scientists, textile and polymer scientists, and engineers who can create new processed foods, create non-food uses for agricultural products, and address problems of solid waste management. Concomitant research in this area would assess consumer and industrial acceptance, product quality and safety, as well as the creation of new products and uses.

Priorities for U.S. agriculture are shifting from production driven markets to consumer driven markets; from a focus on commodities to the quality of the workforce which has the capacity to convert commodities to consumer acceptable products; from production for domestic markets to production for global markets; from a focus of maximizing productivity to a focus of optimizing productivity in concert with the environment; and from the cure of disease to production of a nutritious food supply which will help prevent disease. The USDA in concert with the land grant university system which includes colleges of home economics, veterinary medicine, forestry and engineering as well as agriculture; has the responsibility and capacity to lead these and other transitions and should be organized to do so.

NASULGC National Association of State Universities and Land-Grant Colleges

TESTIMONY

Before the

SUBCOMMITTEE ON DEPARTMENT OPERATIONS AND NUTRITION

of the

COMMITTEE ON AGRICULTURE, U. S. HOUSE OF REPRESENTATIVES

on

Priorities for Research and Education at the U. S. Department of Agriculture

Presented by

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Board on Veterinary Medicine
National Association of State Universities and Land-Grant Colleges

March 25, 1993

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STATEMENT FOR VETERINARY MEDICINE

Under the aegis of the NASULGC Commission on Food, Environment, and Renewable Resources, Veterinary Medicine stands alongside Agriculture, Home Economics, Forestry & Natural Resources, and Oceans & Atmosphere in shouldering its responsibilities to both human and animal health and well-being. These statutory and professional obligations extend to animal health and disease, animal welfare, public health and regulatory medicine (including animal diseases transmissible to humans), environmental issues, and public policy related to the use of animals and products for the benefit of animals. Performance of these obligations will necessitate attention given to the funding of higher education, research, development and technology transfer.

It is important to preserve and foster multilateral relationships with the allied sciences for the sake of economy, efficiency, and effectiveness.

CRITICAL ISSUES

1. PRODUCTION ANIMAL MANAGEMENT - Veterinary research based upon a comprehensive approach to food animal health will advance the management of animal production systems.

2. FOOD SAFETY - research on food safety, particularly during the preharvest phase, is needed to assure wholesome animal origin foods.

3. ENVIRONMENTAL QUALITY - assessment of the interactions of animals and production systems with the environment is essential to the mutual benefits that accrue from improvement of the ecology of both human and animal species, while maintaining agricultural productivity and profitability.

4. ANIMAL WELFARE - further research is needed to define the effects of stress and disease on present day animal production systems. Better understanding of normal and pathological behavior is necessary to control stress and improve management. This in turn will enhance production cost:benefit ratio as well as animal well-being.

Accomplishment of these objectives will require coherent public policy that integrates the cognizant disciplines and rewards cooperation between members of such scientific coalitions as found in the Commission on Food, Environment, and Renewable Resources.

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